Centennial Corridor Project

City of Bakersfield and Kern County, CA

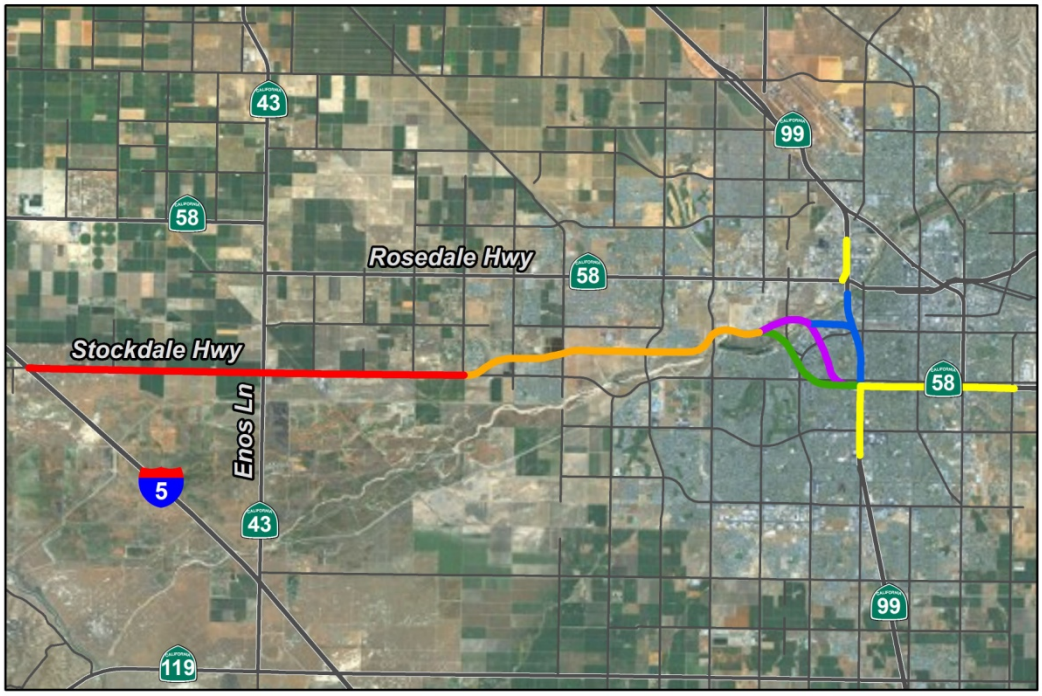
District 06 - KER – 58 - PM T31.7 to PM R55.6

District 06 - KER – 99 - PM 21.2 to PM 26.2

Project ID # 06-0000-0484

SCH #2008091102

Final Paleontological Evaluation Report



November 2012

(Revised February 2014)

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Centennial Corridor
Final Paleontological Evaluation Report

State Route 99 to Interstate 5

KERN COUNTY, CALIFORNIA
District 06-KERN-58-PM T31.7 to PM 55.6
District 06-KERN-99-PM 21.2 to PM 26.2
Project ID# 06-0000-0484

November 2012

STATE OF CALIFORNIA
Department of Transportation

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Summary

Project Description

The California Department of Transportation (Caltrans) proposes to establish a new alignment for State Route (SR) 58, which would provide a continuous route along SR 58 from Cottonwood Road on existing SR 58, east of SR 99 (post mile R55.6), to Interstate 5 (I-5) (post mile T31.7). Improvements to SR 99 (post miles 21.2 to 26.2) and Westside Parkway would also be made to accommodate the connection with SR 58.

The project is located at the southern end of the San Joaquin Valley in the City of Bakersfield in Kern County, California. The study site is bound on the east by Cottonwood Road, on the west by I-5, on the north by Gilmore Avenue, and on the south by Wilson Road. Caltrans is the lead agency for the project pursuant to the California Environmental Quality Act and the National Environmental Policy Act.

The proposed continuous route, known as the Centennial Corridor, has been divided into three segments, although the focus of this Paleontological Evaluation Report (PER) is Segment 1.

Segment 1 is the easternmost segment, which would connect the existing State Route 58 (East) freeway to the Westside Parkway. Multiple alignment alternatives are being evaluated for this segment and are discussed below.

Segment 2 is composed of the Westside Parkway, which extends westerly from Truxtun Avenue to Heath Road. This roadway is a local facility that is currently under construction and would be transferred into the State Highway System. The analysis evaluates potential impacts associated with incorporating the Westside Parkway as part of the State Highway System, as well as improvements to the Westside Parkway from Truxtun Avenue to the Calloway Drive interchange which would be made to facilitate traffic operations between the Westside Parkway and the Centennial Corridor. The analysis reports the relevant results of the *Westside Parkway Environmental Assessment/Final Environmental Impact Report* and provides updates, as necessary.

Segment 3 would extend from Heath Road to I-5. This segment will need a temporary route adoption for the use of Stockdale Highway between Heath Road and I-5 as an interim alignment for State Route 58. A future new alignment (ultimate) as identified

in the 2002 *Route 58 Route Adoption Project Tier I Environmental Impact Statement/Environmental Impact Report* (EIS/EIR) will be constructed when there is greater traffic demand and funding is available. Since traffic would use Stockdale Highway between Heath Road and I-5 on an interim basis, the potential impacts will also be evaluated for the interim use of Stockdale Highway. Improvements to the Stockdale Highway/State Route 43 (known locally as Enos Lane) intersection would be made to accommodate the additional traffic.

Study Purpose and Methods

This Paleontological Evaluation Report focuses on Segment 1. The improvements in Segment 2 are limited to improvements within the Westside Parkway right-of-way, an area previously disturbed for the construction of the Westside Parkway. The improvements in Segment 3 are limited to minor intersection improvements and the depth of construction would be limited to five feet or less.

A previous Paleontological Evaluation Report done for the nearby SR 99/Hosking Avenue Interchange-New Construction Project (Lander and Riseley 2008) and an earlier study for the SR 180 Westside Expressway Route Adoption Study (Lander and Harlan 2006) indicated that there was a high potential for scientifically significant fossil remains and previously unrecorded fossil localities being encountered by earth-moving activities in one or more of the four sedimentary or stratigraphic rock units that underlie most of the project area. The investigation by Lander and Harlan (2006) included an archival search at the University of California Museum of Paleontology (UCMP).

This Paleontological Evaluation Report was prepared by Dr. E. Bruce Lander, a Principal Paleontologist with Paleo Environmental Associates, Inc. (PEAI). Patrick W. Riseley, a PEAI geologist and a California Professional Geologist, reviewed the text on geology provided in this report. A windshield field survey of the project area was done on March 22 and 23, 2010, by Mark A. Roeder, the PEAI field supervisor.

Affected Environment

The project area is situated on the San Joaquin Valley floor, a comparatively featureless plain that slopes gently in a southwesterly direction to the valley axis and, near its northeastern end, the project area crosses the Kern River. Regional surficial geologic mapping indicates that the project area is underlain by four sedimentary stratigraphic units, all of continental origin. In ascending stratigraphic order, these stratigraphic units include Pleistocene Nonmarine Sedimentary Deposits (includes

Turlock Lake and Riverbank Formations elsewhere in the San Joaquin Valley), Recent Alluvial Fan Deposits of the Great Valley (includes Modesto Formation elsewhere in the San Joaquin Valley), Recent Basin Deposits of the Great Valley, and Recent River and Major Stream Channel Deposits of the Great Valley.

Fossilized remains of mostly extinct continental vertebrate species have been recorded in Pleistocene non-marine deposits at numerous localities in the San Joaquin Valley. Additionally, although Holocene deposits are typically too young to yield fossilized remains, Pleistocene age fossils have also been recovered in units mapped on the surface as Holocene age in other areas of the San Joaquin Valley, indicating that Pleistocene sediments were either present immediately below or that fossils from surrounding Pleistocene deposits were re-deposited in the Holocene age sediments. Excavation in units identified as Holocene is not likely to encounter Pleistocene sediments at depths above five feet as referenced to the native ground surface. All of these rock units have produced the fossilized remains of mostly extinct, continental vertebrate species of Pleistocene age at numerous, previously recorded fossil localities elsewhere in the San Joaquin Valley, but probably at depths greater than 3 feet below previous grade in the latter three units.

Environmental Consequences

Construction-related earth-moving activities would have a potential to adversely affect paleontological resources where the project area is underlain by Pleistocene Nonmarine Sedimentary Deposits and, at depths at least 3 feet below current grade, Recent Alluvial Fan Deposits of the Great Valley, Recent Basin Deposits of the Great Valley, and Recent River and Major Stream Channel Deposits of the Great Valley. Such earth-moving activities would include excavation for those segments of roadways that would be below current grade, particularly for Alternatives B and C, augering for bridge and overpass supports for segments of roadways that would be above grade, and trenching for pipelines and culverts.

Excavation activities could reach depths up to 25 feet below the current ground surface in certain locations. Potentially affected resources could include previously unrecorded fossilized remains, the respective fossil localities, associated specimen data and corresponding geologic and geographic locality data, and the fossil-bearing strata. The disturbance or loss of these resources would be an adverse environmental impact.

Preliminary Paleontological Mitigation Measures

Paleontological resources, particularly highly important fossil-bearing stratigraphic units, underlie the project area and would be adversely affected by project-related earth-moving activities. Consequently, it is required that a principal paleontologist meeting Caltrans' experience and educational requirements be retained to prepare a Paleontological Mitigation Plan (PMP). As appropriate, specific measures in the Paleontological Mitigation Plan would be implemented before, during, or after project construction. Such measures could include: (1) monitoring of earth-moving activities by a paleontological monitor in areas underlain by a highly important rock unit, thereby allowing for the discovery and recovery of potentially present larger fossil remains; (2) the collection and processing of sediment or sedimentary rock samples to allow for the recovery of smaller fossil remains; (3) comprehensive treatment (preparation to point allowing identification, identification by knowledgeable paleontologists, curation, cataloging) of recovered fossil remains; and (4) the transfer of the entire fossil collection to a Caltrans-designated museum repository for permanent storage and maintenance.

With implementation of appropriate mitigation measures identified below providing for the recovery and treatment of scientifically significant fossil remains exposed by such activities, adverse impacts resulting from the project would be minimized.

Paleontological mitigation commitments for the Centennial Corridor project will include:

1. Specifications for paleontological mitigation shall be included in the construction contract special provisions section for this project to advise the construction contractor of the requirement to cooperate with the salvage of paleontological resources, particularly fossil remains and associated locality data.

2. A qualified Principal Paleontologist approved by Caltrans will prepare a detailed Paleontological Mitigation Plan prior to the start of construction. The Paleontologist will have a M.S. or Ph.D. degree in paleontology or geology and will be familiar with paleontological salvage or mitigation procedures and techniques. All geologic work will be performed under the supervision of a California Professional Geologist.

3. The State will perform paleontological monitoring and salvage during construction operations or related activities involving subsurface disturbance

on this project. Within the boundaries of the project area, no construction or related activities, which may involve subsurface disturbance, are allowed without written authorization of the Engineer. The State will provide a Paleontological Salvage Team consisting of a State contracted qualified Principal Paleontologist and Paleontological Monitors. The Engineer will make arrangements for the Paleontological Salvage Team to be at the job site.

4. If unanticipated fossils are discovered in an area of the project site not being actively monitored, the remains shall not be disturbed. All work within a 60-foot radius of the discovery will stop, the area will be protected and the Engineer will be notified. The Department will investigate and modify the dimensions of the protected area if necessary. Paleontological resources will not be removed from the job site without authorization. Work will not resume within the specified radius of the discovery until authorized.

5. There will be 15 days notification to the paleontological salvage team in advance of the start of subsurface disturbing operations.

6. The construction contractor will attend a pre-construction meeting with the Paleontological Salvage Team and the Engineer to establish procedures for cooperation and provide for worker safety during monitoring and salvage activities. The Principal Paleontologist and Caltrans Paleontology Coordinator will be present at pre-grading meetings to consult with grading and excavation contractors.

7. Before any earth-moving activity, the Principal Paleontologist shall conduct an employee environmental awareness training session for all persons involved in that earth-moving activity.

8. Prior to the start of earth-moving activities the Paleontological Salvage Team will conduct a preconstruction field survey of the project area and any exposed fossil remains will be recovered. A qualified Paleontological Monitor under the direction of the Principal Paleontologist will be on site to inspect cuts for fossils at all times during original grading involving sensitive geologic formations. If necessary, additional personnel will be assigned to recover unusually large or numerous fossils.

9. The Paleontological Salvage Team will monitor and salvage appropriate fossil specimens identified during excavation. Members of the Paleontological

Salvage Team may temporarily divert or stop construction operations in the vicinity of a paleontological find or notify of the need to avoid disturbing a site pending removal of the specimens. When fossils are discovered, the paleontology monitor will recover them and contact a Principal Paleontologist for assistance. Construction work in these areas will be halted or diverted to allow recovery of fossil remains in a timely manner.

10. Bulk sediment or rock samples will be recovered from fossiliferous horizons and processed to allow for the recovery of microvertebrate and other microfossil remains, as determined necessary by the Principal Paleontologist.

11. Fossil remains collected during the monitoring and salvage portion of the mitigation program will be cleaned, prepared, sorted, and cataloged. Recovered specimens will be prepared and identified by appropriate paleontology specialists.

12. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, will then be deposited in a Caltrans approved scientific institution with paleontological collections and made available for future scientific study.

13. A final report will be completed that outlines the results of the mitigation program and will be signed by the Principal Paleontologist and Professional Geologist. A copy of the report will be supplied to the museum repository and to Caltrans.

14. At the completion of the project, the Caltrans Paleontology Coordinator will prepare a paleontology stewardship summary with a list of any long term commitments. The list will be provided to both Maintenance and Operations staff, including the Encroachment Permits Office.

Key Words[1]

Alluvial fan deposits – The gently sloping, fan-shaped accumulation of layered sediments laid down by a fast-flowing stream when it slows when exiting a canyon and spreads its sediment load downstream on the adjacent, comparatively flat-lying, valley floor.

Basin Deposits – The nearly flat-lying layered sediments laid down by flooding streams.

Bison – The members of the genus *Bison*, which includes the North American buffalo, the European wisent, and their extinct Pleistocene or Ice Age ancestors from North America, Europe, and Asia.

Clastic rock – A layered sedimentary rock comprising fragments of previously existing rocks that were transported to a depositional site.

Continental vertebrate – The members of the subphylum Vertebrata, which includes animals with backbones or spinal columns that live on land, and comprises all freshwater fishes and amphibians (frogs, salamanders), most reptiles (turtles/tortoises, lizards, snakes, dinosaurs), birds, and all land mammals.

Epoch – The period of geologic time characterized partly by its distinctive fossil taxa.

Fauna – The animals of a specific region, environment, rock unit, and period of geologic time.

Formation – A stratigraphic or sedimentary unit representing a distinct body of layered (stratified) sediments and sedimentary, metamorphic, or extrusive igneous rocks of a particular type.

Fossil – The preserved remains (including bones, shells, or leaves) or other indications (such as tracks, burrows, or impressions) of past life.

Fossil land mammal – The preserved remains of an ancient mammal that lived on land.

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[1] Most of the following definitions are from Bates and Jackson (1984) and the United States Geological Survey (2006) with some modifications.

Fossil assemblage – A group of ancient species occurring in a local and restricted sequence of sedimentary rock.

Geologic time scale – An arbitrary sequence comprising named units of geologic time and their corresponding formations, fossil taxa, and geologic events, and usually presented as a chart with the younger units appearing nearer the top.

Geology – Study of the Earth, including its constituents, the processes acting on them, the resulting products, and the history of the planet and its life forms since its origin.

Holocene – The second and final epoch of the Quaternary Period that follows the Pleistocene Epoch and spans the time between about 11,000 years ago and the present.

Igneous rocks – The rocks formed by their crystallization from a molten state and including (1) extrusive igneous rocks (lavas), which are formed when molten rock or magma flows onto the Earth's surface, where they solidify, and (2) intrusive igneous (plutonic) rocks, which form when magma solidifies far below the Earth's surface.

Irvingtonian – The North American land mammal age (NALMA) that lies between the Blancan and Rancholabrean NALMAs, corresponds to the earlier part of the Pleistocene Epoch (Ice Age), and spans the time between about 1.9 or 1.7 million and 240,000 years ago.

Lithology – The physical characteristics of a rock, including color, mineral composition, grain size, hardness or degree of consolidation, and development and thickness of layering.

North American Land Mammal Age (NALMA) – The subdivisions of the Cenozoic Era (Age of Mammals) based on successive, distinctive, and age-diagnostic fossil land mammal assemblages from North America.

Paleontology – The study of ancient life.

Pleistocene – The first or earlier epoch (the Ice Age) of the Quaternary Period that lies between the Pliocene Epoch of the Neogene Period and the Holocene Epoch of the Quaternary Period, and spans the time between about 1.8 million and 11,000 years ago.

Quaternary – The second or last period of the Cenozoic Era (Age of Mammals) that follows the Neogene Period, contains the Pleistocene and Holocene Epochs, and spans the time between about 1.8 million years ago and the present.

Rancholabrean – The North American land mammal age (NALMA) that lies between the Irvingtonian NALMA and the Holocene Epoch, corresponds to the latter part of the Pleistocene Epoch (Ice Age), and spans the time between about 240,000 years and 11,000 years ago.

Recent – Holocene.

Sediment – The unconsolidated rock and mineral fragments that come from the weathering of rocks; are transported by water, ice, or air; and are deposited as layers on the Earth's surface, or are the result of chemical precipitation from water or secretion by living organisms.

Sedimentary rock – Consolidated sediments.

Stratigraphy – The study of stratified or layered sedimentary and extrusive igneous rocks, metamorphic and intrusive igneous rocks, and their physical and temporal relations.

Stratum (pl. strata) – A sedimentary or extrusive igneous rock layer.

Taxon (pl. taxa) – A group, such as a genus or species, that is often named and classified, and represents closely related organisms united by physical or structural similarities and a common evolutionary history.

Tertiary – The first period of the Cenozoic Era (Age of Mammals, which follows Mesozoic Era or Age of Reptiles) that precedes the Quaternary Period and spans the time between about 65 million and 1.8 million years ago.

USGS 7.5-Minute Quadrangle – A topographic map prepared by the United States Geological Survey (USGS) at a scale of 1:24,000.

USGS 30 X 60 Minute Quadrangle – A topographic map prepared by the United States Geological Survey (USGS) at a scale of 1:100,000.

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Acronyms and Abbreviations

BLM	United States Department of the Interior, Bureau of Land Management
BNSF	BNSF Railway
Caltrans	California Department of Transportation
C-D	Collector-Distributor
CEQA	California Environmental Quality Act
CGS	California Geological Survey
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
I	Interstate
KCGP	Kern County General Plan
LACM	Natural History Museum of Los Angeles County, Vertebrate Paleontology Department
NALMA	North American Land Mammal Age
NEPA	National Environmental Policy Act
PEAI	Paleo Environmental Associates, Inc.
PER	Paleontological Evaluation Report
PIR	Paleontological Identification Report
PL	Public Law
PM	post mile
PMP	Paleontological Mitigation Plan
PMR	Paleontological Mitigation Report
PRC	Public Resources Code
Project	Centennial Corridor Project
SER	Standard Environmental Reference
SVP	Society of Vertebrate Paleontology Impact Mitigation Guidelines Revision Committee
SR	State Route
TRIP	Thomas Roads Improvement Program
UCMP	University of California Museum of Paleontology
USGS	United States Geological Survey

Section 1 Introduction

The purpose of this Paleontological Evaluation Report (PER) is three-fold: (1) to identify and evaluate the paleontological resources of Segment 1 of the Centennial Corridor Project area in the greater Bakersfield area of southern Kern County, California; (2) to assess the potential adverse impacts of project-related earth-moving activities on the paleontologic resources of the project area; and (3) to provide preliminary site-specific measures to mitigate such impact on these resources. The Thomas Roads Improvement Program is a cooperative effort between the City of Bakersfield, the County of Kern, the Kern Council of Governments, and the California Department of Transportation (Caltrans). Caltrans is the lead agency for the project for both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

Paleontological resource investigations done in support of this Paleontological Evaluation Report indicated that the project area was underlain by four early or middle Pleistocene to Holocene continental sedimentary stratigraphic units. These units have yielded fossilized remains representing extinct species of Ice Age land mammals at numerous previously recorded fossil localities scattered across the San Joaquin Valley. Two of the localities occurred very near the project area. These fossil occurrences suggest that there is a high potential for the loss of scientifically significant fossil remains as a result of construction-related earth-moving activities in the project area. Accordingly, Caltrans required that this Paleontological Evaluation Report be prepared and would require that a Paleontological Mitigation Plan (PMP) be implemented in support of project-related earth-moving activities.

1.1 Project Description

Introduction

The California Department of Transportation (Caltrans) proposes to establish a new alignment for State Route 58, which would provide a continuous route along State Route 58 from Cottonwood Road on existing State Route 58, east of State Route 99 (post mile R55.6), to Interstate 5 (I-5) (post mile T31.7). Improvements to State Route 99 (post miles 21.2 to 26.2) and Westside Parkway would also be made to accommodate the connection with State Route 58.

The project is located at the southern end of the San Joaquin Valley in the city of Bakersfield in Kern County, California. The study site is bound on the east by Cottonwood Road, on the west by I-5, on the north by Gilmore Avenue, and on the south by Wilson Road. Caltrans is the lead agency for the project pursuant to the California Environmental Quality Act and the National Environmental Policy Act.

The proposed continuous route, known as the Centennial Corridor, has been divided into three segments, as shown in Figure 1.

Segment 1 is the easternmost segment, which would connect the existing State Route 58 (East) freeway to the Westside Parkway. Multiple alignment alternatives are being evaluated for this segment and are discussed below.

Segment 2 is composed of the Westside Parkway, which extends westerly from Truxtun Avenue to Heath Road. This roadway is a local facility that is currently under construction and would be transferred into the State Highway System. The analysis evaluates potential impacts associated with incorporating the Westside Parkway as part of the State Highway System, as well as improvements to the Westside Parkway from Truxtun Avenue to the Calloway Drive interchange which would be made to facilitate traffic operations between the Westside Parkway and the Centennial Corridor. The analysis reports the relevant results of the *Westside Parkway Environmental Assessment/Final Environmental Impact Report* and provides updates, as necessary.

Segment 3 would extend from Heath Road to I-5. This segment will need a temporary route adoption for the use of Stockdale Highway between Heath Road and I-5 as an interim alignment for State Route 58. A future new alignment (ultimate) as identified in the 2002 *Route 58 Route Adoption Project Tier I Environmental Impact Statement/Environmental Impact Report* (EIS/EIR) will be constructed when there is greater traffic demand and funding is available. Since traffic would use Stockdale Highway between Heath Road and I-5 on an interim basis, the potential impacts will also be evaluated for the interim use of Stockdale Highway. Improvements to the Stockdale Highway/State Route 43 (known locally as Enos Lane) intersection would be made to accommodate the additional traffic.

Purpose and Need

The purpose of the Centennial Corridor project is to provide route continuity and associated traffic congestion relief along State Route 58 within Metropolitan Bakersfield and Kern County from State Route 58 east (at Cottonwood Road) to I-5.

State Route 58 is a critical link in the state transportation network that is used by interstate travelers, commuters, and a large number of trucks. Under existing conditions, State Route 58 does not meet the capacity needs of the area, and this is expected to get worse as the population grows. State Route 58 lacks continuity in central Bakersfield, which results in severe traffic congestion and reduced levels of service on adjoining highways and local streets. This route is offset by about 1 mile at State Route 43 and by about 2 miles at State Route 99. The merging of two major state routes (58 and 99) into one alignment between the eastern and western legs of State Route 58 degrades the traffic level of service on this segment of freeway. In addition, State Route 99's close spacing for its two interchanges with State Route 58 (East and West), in addition to an interchange at California Avenue, results in vehicles aggressively changing lanes, which adds to the congestion.

Project Description

The project alternatives include three build alternatives and a No-Build Alternative.

No-Build Alternative

No construction of Segment 1 would occur under the No-Build Alternative. In addition no improvements to the Westside Parkway from Truxtun Avenue to the Calloway Drive interchange would be required. There would also be no improvements made to the Stockdale Highway/State Route 43 intersection. The No-Build Alternative would involve the following actions: (1) the Westside Parkway would be route adopted into the State Highway System; (2) the portion of Mohawk Street from the Westside Parkway to Rosedale Highway would be designated as part of State Route 58, which would provide a connection to State Route 99; (3) Stockdale Highway between Heath Road and Interstate 5 would serve as an interim alignment for State Route 58 until ultimate improvements are constructed; and (4) the portion of State Route 58 (West) from Allen Road to Interstate 5 would be relinquished to the local jurisdictions as a local facility.

Build Alternatives

As shown in Figure 2, the three build alternatives (Alternatives A, B, and C) within Segment 1 propose new alignments that would extend from Cottonwood Road on the existing State Route 58 (East) and connect I-5 via the Westside Parkway. Alternatives A and B would be west of State Route 99, and Alternative C would parallel State Route 99 to the west. Under Alternative A, the eastern end of the Westside Parkway mainline would be realigned to conform to the Alternative A alignment, and ramp connections would be provided to the Mohawk Street interchange. Under Alternatives B and C, the alignments would connect to the Westside Parkway by extending the mainline lanes built as part of the Westside Parkway project. Detailed descriptions of the alternatives are provided on the following subsections.

Common Design Features of Build Alternatives

The build alternatives would connect SR 58 (East) to the east end of the Westside Parkway by means of a six-lane freeway. All the build alternatives would involve a route adoption to include the selected Segment 1 alignment and the Westside Parkway into the State Highway System as State Route 58. In Segment 3 the route adoption would include the adoption of Stockdale Highway as the interim State Route 58 connection to Interstate 5, as well as the designation of the ultimate alignment (the Cross Valley Canal alignment addressed in the 2001 EIS/EIR), which would be constructed at a later date. Though the alignment and design characteristics vary by alternative, the three build alternatives have the following common design features:

Segment 1

All the alternatives would provide the following connections between State Route 58 and State Route 99 using high speed connection ramps:

- Northbound State Route 99 to westbound Centennial Corridor
- Northbound State Route 99 to eastbound State Route 58 (East)
- Southbound State Route 99 to eastbound State Route 58 (East)
- Eastbound Centennial Corridor to southbound State Route 99.
- Westbound State Route 58 (East) to southbound and northbound State Route 99.

Direct connector ramps from southbound State Route 99 to westbound State Route 58 are not being provided as part of this project. However, to accommodate this movement, the southbound State Route 99/Rosedale Highway off-ramp would have two lanes off the freeway and be widened to four lanes at the intersection with Rosedale Highway. Additionally, an auxiliary lane would be provided on State Route

99 from south of Gilmore Avenue to the State Route 58 (Rosedale Highway) off-ramp. Direct connector ramps from eastbound State Route 58 to northbound State Route 99 are not being provided as part of this project.

The project would require the widening of the South P Street Undercrossing and the westbound State Route 58 Grade Separation over State Route 99. In addition, the Stockdale Highway off-ramp from southbound State Route 99 and the Wible Road on- and off-ramps on State Route 99, located just south of the existing State Route 58/State Route 99 interchange, would be removed.

Segment 2

The Westside Parkway (currently under construction) would be incorporated into the State Highway System with each of the Build Alternatives. Improvements to connect Centennial Corridor to the Westside Parkway would extend from where each build alternative connects at the eastern end of the Westside Parkway towards the west, ending at the Calloway Drive interchange. The proposed improvements would widen the Westside Parkway by constructing one additional lane in the median to provide auxiliary lanes. In the westbound direction, the median widening would extend from east of the Friant-Kern Canal through the Calloway Drive interchange. The limits of the added lane in the eastbound direction would differ between each alternative, as described in the Unique Design Features of the Build Alternatives section below. With each build alternative, modifications to the westbound diamond off-ramp to Calloway Drive and the eastbound loop on-ramp from Coffee Drive would be required.

Though the improvements described above are physically located in Segment 2, construction would be undertaken as part of Segment 1 construction to facilitate traffic operations between the Westside Parkway and the Centennial Corridor.

Segment 3

With each build alternative, the Stockdale Highway/State Route 43 intersection would be widened and traffic signals would be added to control the traffic movements. State Route 43 would be widened to add a dedicated left-turn lane in both directions. Stockdale Highway would be widened to add a dedicated left-turn lane and a shared through/right-turn lane in both directions. Though physically located in Segment 3, these improvements would be built as part of Segment 1 to ensure adequate traffic operations at this intersection.

Unique Design Features of the Build Alternatives

Alternative A

Alternative A would travel westerly from the existing SR 58/SR 99 interchange for about 1 mile, south of Stockdale Highway, where it would turn northwesterly and go over Stockdale Highway/Montclair Street, California Avenue/Lennox Avenue, Truxtun Avenue, and the Kern River before joining the eastern end of the Westside Parkway near the Mohawk Street interchange (Figure 3).

A link would be provided from northbound SR 99 to westbound SR 58 and from eastbound SR 58 to southbound SR 99 via high speed connectors. No direct connector ramps would be built from southbound SR 99 to westbound SR 58 or from eastbound SR 58 to northbound SR 99. Southbound SR 99 would be widened to accommodate the additional traffic from eastbound SR 58 to the southbound SR 99 connector. The existing westbound SR 58 to southbound SR 99 loop-ramp connector would be realigned and would connect to the proposed eastbound SR 58 to southbound SR 99 connector before merging onto southbound SR 99. The existing southbound SR 99 to eastbound SR 58 connector and northbound SR 99 to eastbound SR 58 would be preserved with some changes.

The limits of widening on SR 99 would extend to the Wilson Road overcrossing. On northbound SR 99, a three-lane exit would be provided just north of Wilson Road to carry the northbound SR 99 to westbound SR 58 traffic on two lanes and the Ming Avenue on- and off-ramp traffic on the third lane. All ramps in this area would have to be realigned to provide for the additional lanes. The Wible Road on- and off-ramps just south of the existing SR 58/SR 99 interchange, which is in conflict with the Caltrans standards of interchange spacing, would have to be removed to accommodate this design. The Stockdale Highway off-ramp on the southbound SR 99 to eastbound SR 58 connector would be removed as well. Under this concept, SR 58 would also lose its link with Real Road. Also, Alternative A would provide an auxiliary lane on southbound SR 99 from south of Gilmore Avenue to the Rosedale Highway off-ramp.

The median widening to provide an auxiliary lane along the Westside Parkway would extend westerly from the connection point with Centennial Corridor between Coffee Road and Mohawk Street to the Coffee Road off-ramp.

Other features with this alternative include (1) the construction of 19 soundwalls; (2) the construction of a park and ride facility off Mohawk Street, between California

Avenue and Truxtun Avenue, to replace the facility that would be displaced by the project; (3) 7 infiltration basins, which would be placed throughout the study area to retain stormwater runoff for water quality improvement purposes; and (4) 48 retaining walls of varying sizes located throughout the study area.

Excavation and grading would be required as part of the project construction. The maximum depth of excavation for Alternative A would be between 25 and 40 feet. Alternative A would disturb about 1,125 acres of soil from grading activities. A total of about 944,000 cubic yards of existing soils would be graded. In addition, about 1,700,000 cubic yards of soil would be imported as fill for the roadway.

Alternative B

Alternative B would run westerly from the existing SR 58/SR 99 interchange for about 1,000 feet, south of Stockdale Highway, where it would turn northwesterly and span Stockdale Highway/Stine Road, California Avenue, Commerce Drive, Truxtun Avenue, and the Kern River before joining the east end of the Westside Parkway between the Mohawk Street and Coffee Road interchanges. This alignment would depress SR 58 between California Avenue and Ford Avenue,. Overcrossings are proposed at Marella Way and La Mirada Drive to ease traffic circulation (Figure 4).

Alternative B proposes the same connections to SR 99 that Alternative A does and would require similar improvements on SR 99 and existing SR 58.

The median widening to provide an auxiliary lane along the Westside Parkway would extend in the eastbound direction from the Coffee Road off-ramp to the connection with Centennial Corridor at Truxtun Avenue. Modifications would be required to the eastbound Mohawk Street off-ramp, westbound Truxtun Avenue on-ramp, and the eastbound Mohawk Street loop on-ramp. In addition, construction of the proposed westbound Mohawk Street off-ramp and realignment of the Cross Valley Canal maintenance access road from Mohawk Street would be required.

Other features with this alternative include (1) the construction of 24 soundwalls; (2) the construction of a park and ride facility north of California Avenue, next to the Centennial Corridor, to replace the facility that would be displaced by the project; (3) 8 infiltration basins that would be placed throughout the study area to retain stormwater runoff for water quality improvement purposes; and (4) 42 retaining walls of varying sizes located throughout the study area.

The maximum depth of excavation for Alternative B would be between 25 and 40 feet. Alternative B would disturb about 1,020 acres of soil from grading activities. A total of about 942,000 cubic yards of existing soils would be graded. In addition, about 1,078,000 cubic yards of soil would be imported to fill in the roadway.

Alternative C

Near the existing SR 58/SR 99 interchange, Alternative C would turn north and run parallel to the west of SR 99 for about 1 mile. The freeway would turn west and span the BNSF Railway rail yard, Truxtun Avenue, and the Kern River. This alternative proposes undercrossings at Brundage Lane, Oak Street, SR 99, Palm Avenue, and California Avenue (Figure 5).

Connections would be provided from eastbound SR 58 to southbound SR 99 and from northbound SR 99 to westbound SR 58. The existing westbound SR 58 to southbound SR 99 loop ramp connector would connect to the proposed eastbound SR 58 to southbound SR 99 connector before merging onto southbound SR 99. The southbound SR 99 Ming Avenue off ramp would be relocated north of the eastbound SR 58 to southbound SR 99 connector to facilitate weaving between the Ming Avenue off ramp and the eastbound SR 58 to southbound SR 99 connector traffic. A connector would be provided east of northbound SR 99 from Brundage Lane to south of California Avenue to facilitate weaving between westbound SR 58 to northbound SR 99 traffic with northbound SR 99 to westbound SR 58 traffic.

Improvements on SR 99 would extend from the Wilson Road overcrossing (south of the SR 58/SR 99 interchange) to the Gilmore Avenue overcrossing (north of the SR 58/SR 99 interchange). A collector-distributor (C-D) road system would provide access from westbound SR 58 to northbound SR 99, as well as from northbound SR 99 to westbound SR 58. The Wible Road on- and off ramps just south of the existing SR 58/SR 99 interchange would have to be removed to accommodate the northbound SR 99 auxiliary lane. The Stockdale Highway off-ramp on the southbound SR 99 to eastbound SR 58 connector would be removed as well. Under this concept, southbound SR 99 would also lose its link with Real Road.

The median widening to provide an auxiliary lane along Westside Parkway would extend in the eastbound direction from the Coffee Road off-ramp to the connection with Centennial Corridor at Truxtun Avenue. Modifications would be required to the eastbound Mohawk Street off-ramp, westbound Truxtun Avenue on-ramp, and the eastbound Mohawk Street loop on-ramp. In addition, construction of the proposed

westbound Mohawk Street off-ramp and realignment of the Cross Valley Canal maintenance access road from Mohawk Street would be required.

Other features with this alternative include (1) the construction of 17 soundwalls; (2) the construction of a park and ride facility Real Road and Chester Lane to replace the facility that would be displaced by the project; (3) 11 infiltration basins that would be placed throughout the study area to retain stormwater runoff for water quality improvement purposes; and (4) 42 retaining walls of varying sizes located throughout the study area.

The maximum depth of excavation for Alternative C is between 25 and 40 feet. Alternative C would disturb about 1,124 acres of soil from grading activities. A total of about 1,150,000 cubic yards of existing soils would be graded. In addition, about 750,000 cubic yards of soil would be imported to fill in the roadway.

1.2 Paleontological Resources

Previous Paleontological Studies in Region

Surficial geologic mapping by Smith (1964) indicates that the project area is underlain by four sedimentary or stratigraphic rock units, all of continental origin. In ascending stratigraphic order, these rock units include Pleistocene Nonmarine Sedimentary Deposits, Recent Alluvial Fan Deposits of the Great Valley, Recent Basin Deposits of the Great Valley, and Recent River and Major Stream Channel Deposits of the Great Valley (Wagner 2007). The latter three sedimentary units are of Recent or Holocene age only at and very near the current ground surface, but become progressively older with increasingly greater depths below the surface. Wagner (2007), however, did not record the presence of the basin deposits in the project area, nor any previously recorded fossil locality from these stratigraphic units in his paleontological resource inventory of the project area. In contrast, Caltrans-sponsored studies for the nearby SR 99/Hosking Avenue Interchange-New Connection Project (Lander and Riseley 2008) and the SR 180 Westside Expressway Route Adoption Study (Lander and Harlan 2006) indicated that all of these sedimentary units have produced the fossilized remains of mostly extinct, continental vertebrate species of Pleistocene age elsewhere in the San Joaquin Valley. Consequently, there is a potential for similar remains being encountered by construction-related earth-moving activities in the project area.

1.3 Regulatory Setting

Paleontology is the study of ancient life and is based on the analysis of fossilized remains representing mostly extinct species of plants and animals (California Geological Survey [CGS] 2002). Fossil remains, in turn, provide information on (1) the types of plants and animals that once existed, (2) when they first appeared in the fossil record and when they became extinct, (3) where and how they lived, and (4) the types of environments in which they existed (CGS 2002). As a consequence, fossil remains have been essential in (1) documenting the evolution and relationships of particular groups of organisms, (2) determining the geologic ages of fossil-bearing strata, and (3) reconstructing the depositional environments represented by the strata.

Paleontological resources comprise fossil remains and the respective fossil localities, associated specimen data and corresponding geologic and geographic locality data, and the fossil-bearing strata. Under NEPA, CEQA, and other federal, California, and local laws, ordinances, regulations, and standards, the disturbance or loss of such resources as a result of a project implementation would be regarded as an adverse environmental impact.

It is the policy of the United States that public lands be managed in a manner that protects the scientific and historical values of these lands (Untied States Department of the Interior, Bureau of Land Management [BLM] 1998a, 1998b). Paleontological resources found on public lands are recognized as a fragile and nonrenewable scientific record of life on Earth, and, therefore, represent an important and critical component of America’s natural heritage.

As a lead agency under both NEPA and CEQA, Caltrans protects and enhances the environment and quality of life in accordance with the environmental, economic, and social goals of California (Caltrans 1992). In so doing, Caltrans evaluates the environmental benefits and consequences of its activities and implements practices that minimize the adverse environmental impacts of these activities. As part of the project development and delivery processes, Caltrans is obligated to conduct paleontological investigations in response to federal, state, and local laws, ordinances, regulations, and standards (Caltrans 2011).

Construction of the project will be funded partly by the United States Department of Transportation. Paleontological resource investigation is an eligible federal highway project cost under the Federal-Aid Highway Act of 1956 (PL 84-627) and 1958 (PL 85-767). This act specifically extends the Antiquities Act of 1906 (PL 59 209) to

protect paleontological resources on highway projects funded by the Federal-Aid Highway Act. The use of Federal-Aid Highway Act funds for conducting paleontological investigations is authorized to the extent deemed necessary by the respective state highway department (e.g., Caltrans) (PL 85-767, 72 Statute 913; PL 86-657, Sec. 8[e], 74 Statute 525; also see 23 United States Code 305), provided that the state is in compliance with the Antiquities Act. Consequently, acceptable documentation in support of the project must be submitted to the Federal Highway Administration (FHWA) by the state highway department. The Antiquities Act requires that any paleontological investigation be carried out by qualified institutions and experts, as determined by the Secretaries of Interior and Agriculture.

Typical federal requirements for performing paleontological investigations under the Antiquities Act are outlined by the BLM. The BLM (1998b) provides detailed federal standards and procedures for managing paleontological resources in compliance with the Antiquities Act. The BLM's (1998b) qualifications for personnel conducting paleontological investigations are similar to those for a qualified principal paleontologist in California, as prescribed in the Caltrans (2011) Standard Environmental Reference (SER).

NEPA (40 CFR Part 1500.2--Policy) requires the identification and assessment of reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment and the use of all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment.

In California, paleontological resources are afforded protection by CEQA; California Administrative Code, Title 14, Section 4306 et seq.; and Public Resources Code (PRC) Section 5097.5. CEQA requires that public agencies not approve a project as proposed if there is a feasible alternative or reasonable mitigation measures available that would substantially lessen the significant environmental effects of the project (Chapter 1, Section 21002). PRC 5097.5 protects vertebrate fossil localities situated on public land, including those localities that have produced fossilized footprints or any other paleontological feature. Typical California requirements for paleontological investigations and mitigation are outlined in the Caltrans (2011) Standard Environmental Reference, Volume 1, Chapter 8—Paleontology.

The 2009 Kern County General Plan (KCGP) protects significant paleontological areas and requires that land use plans address and be specifically evaluated for their impact on areas of paleontological importance (County of Kern 2009). It is the policy of the County of Kern to promote the preservation of cultural and historic resources that provide ties to the past and constitute a heritage value to residents and visitors (KCGP Section 1.10.3, Archaeological, Paleontological, Cultural, and Historical Preservation). A geologist registered in the State of California, within or retained by the County, must evaluate geologic reports required by the KCGP and advise the Kern County Planning Agency of their findings (KCGP Section 1.3, Physical and Environmental Constraints).

The 2007 Metropolitan Bakersfield General Plan (Chapter 5B, Conservation Element, Mineral Resources) includes policies that encourage the protection of fossil remains (City of Bakersfield 2007).

1.4 Required Studies

A Paleontological Identification Report (PIR), which is the preliminary analysis to determine if paleontological resources are expected to be present in the study area, was not deemed necessary because the Paleontological Evaluation Report for the nearby SR 99/Hosking Avenue Interchange-New Construction Project (Lander and Riseley 2008) indicated that there was a high potential for scientifically significant fossil remains and previously unrecorded fossil localities being encountered by earth-moving activities in the Recent Alluvial Fan Deposits of the Great Valley. These same deposits underlie most of the project area. Moreover, an earlier study for the SR 180 Westside Expressway Route Adoption Study (Lander and Harlan 2006) documented the occurrences of numerous previously recorded fossil localities scattered across the San Joaquin Valley and from all four of the sedimentary or stratigraphic rock units underlying this project area. However, the previous paleontological resource investigation prepared in support of the project by Wagner (2007) did not document the occurrence of any previously recorded fossil locality from these rock units in the project area vicinity. Therefore, the potential for fossil remains and unrecorded fossil localities being encountered by construction-related earth-moving activities in the project area was regarded as low (Wagner 2007).

In compliance with the Caltrans (2011) Standard Environmental Reference, this Paleontological Evaluation Report does the following: (1) provides a paleontological resource inventory of the project area by underlying stratigraphic unit, (2) evaluates the scientific importance (high, low, none) of such resources from each sedimentary

unit, (3) discusses and assesses the potential environmental impacts of construction-related earth-moving activities in those parts of the project area underlain by the unit, based on a determination that fossilized remains might or might not be encountered by these activities, and (4) provides preliminary site specific measures for mitigating these impacts. By implementing such measures under a Paleontological Mitigation Plan, Caltrans would ensure project compliance with existing environmental statutes requiring the mitigation of significant impacts on paleontological resources to an insignificant level. If implemented, the measures would meet this requirement by allowing for the recovery and preservation of fossil remains exposed by such activities and by providing for the recording and archiving of associated data.

Preparation of a Paleontological Identification Report (PIR), which normally would precede a Paleontological Evaluation Report (Caltrans 2011), was determined not necessary for the present project by the inclusion of a paleontological resource inventory in this Paleontological Evaluation Report.

As specified in the Caltrans (2011) Standard Environmental Reference, this Paleontological Evaluation Report will allow the determination of: (1) Caltrans's legal responsibilities under NEPA and CEQA, (2) the need to involve other agencies or stakeholders that might be affected by the project, and (3) the possibility of avoiding scientifically significant paleontologic resources. Because scientifically significant resources have been documented as occurring in the project area, the Paleontological Evaluation Report provides preliminary site-specific mitigation measures based on the underlying stratigraphic unit and the type and magnitude of earth-moving activities to be implemented in those areas underlain by the unit. These measures would be updated, if necessary, and incorporated into a comprehensive Paleontological Mitigation Plan. The Paleontological Mitigation Plan, in turn, would be implemented by a qualified Paleontologic Contractor before project-related earth-moving activities start and would continue until just after such activities are completed, as appropriate.

1.5 Preparer Qualifications

This Paleontological Evaluation Report was prepared by Dr. E. Bruce Lander, a principal paleontologist with Paleo Environmental Associates, Inc. (PEAI). He also conducted the literature and map reviews and the archival searches in support of the Paleontological Identification Report. Dr. Lander has Ph.D. and M.A. degrees in paleontology and a B.S. degree in geology. He has over 45 years of professional

experience as a paleontologist and more than 30 years as a paleontological consultant involved in paleontological resource management and NEPA/CEQA compliance.

Dr. Lander has extensive experience preparing Paleontological Identification Reports, Paleontological Evaluation Reports, Paleontological Mitigation Plans, Paleontological Mitigation Reports, and environmental impact review documents in support of a number of other Caltrans-sponsored roadway construction projects, including the SR 178 Comanche Rehab Project and the SR 99/Hosking Avenue Interchange-New Construction Project, both in Bakersfield; SR 180 Westside Expressway Route Adoption Study and the SR 41 Sunflower II (Cottonwood Pass) Project, both in the San Joaquin Valley; and the Schuyler Heim Bridge Replacement and SR 47 Expressway Project, the SR 79 Realignment Project, the I-15-French Valley Parkway Interchange Project, the I-15-SR 74 Interchange Project, the SR 14 Freeman Gulch 4 Lane Project, the SR 14 Widening Project (Red Rock Canyon State Park), and the I-10-McNaughton Parkway Interchange Project, all in Southern California.

Patrick W. Riseley reviewed text on geology provided in this Paleontological Evaluation Report. Mr. Riseley has an M.S. degree in geology and is a registered California Professional Geologist. He also is a PEAI geologist and paleontological monitor/field technician. Mr. Riseley has reviewed such text in support of other Caltrans-sponsored projects, including the SR 41 Sunflower II (Cottonwood Pass) Project Paleontological Mitigation Reports and the SR 99/Hosking Avenue Interchange-New Construction Project Paleontological Evaluation Report.

A field survey of the project area was done by Mark A. Roeder, a PEAI field supervisor. Mr. Roeder has a B.A. degree in anthropology. He has conducted such surveys in support of other Caltrans-sponsored projects, including the SR 178 Comanche Rehab Project, the SR 41 Sunflower II (Cottonwood Pass) Project, the SR 79 Realignment Project, the SR 14 Freeman Gulch 4-Lane Project, and the SR 14 Widening Project (Red Rock Canyon State Park).

1.6 Document Standards

In compliance with the Caltrans (2011) Standard Environmental Reference, this Paleontological Evaluation Report (1) provides a paleontological resource inventory and evaluation of the project area by underlying sedimentary or stratigraphic rock unit, (2) discusses and assesses the potential environmental impacts of such earth-moving activities in those areas underlain by each stratigraphic unit, and (3) includes preliminary site-specific measures for mitigating these impacts. By implementing

these mitigation measures, Caltrans would ensure project compliance with existing environmental statutes requiring the reduction of significant impacts on paleontological resources to an insignificant level. If implemented as part of a Paleontological Mitigation Plan, the measures would meet this requirement by allowing for the recovery and preservation of scientifically significant fossil remains exposed by such activities and by providing for the recording and archiving of associated data.

Section 2 Scope of Study

Paleontological resource investigations done in support of this Paleontological Evaluation Report indicated that the project area was underlain by sedimentary or stratigraphic rock units that have yielded fossilized remains at previously recorded fossil localities near the project area or elsewhere in the San Joaquin Valley. These fossil occurrences suggest that there is a potential for the loss of fossil remains as a result of construction-related earth-moving activities in the project area. Accordingly, Caltrans has required that this Paleontological Evaluation Report be prepared in support of project environmental impact review.

2.1 Study Methods

The following tasks were done to compile a baseline paleontological resource inventory of the project area by stratigraphic unit. The inventory allowed a description of the paleontological resource setting of the project area and the preliminary determination that there would be a high potential for fossil remains being encountered by construction-related earth-moving activities where the project area was underlain by a particular rock unit. All tasks done in support of Paleontological Evaluation Report preparation were completed in compliance with the Caltrans (2011) Standard Environmental Reference and with the Society of Vertebrate Paleontology Impact Mitigation Guidelines Revision Committee (SVP 2010) standard procedures for assessing the potential productivity of the paleontological resources in an area of possible environmental effect.

Geologic maps and reports portraying the surficial geology of the project area were reviewed to determine the sedimentary units exposed therein, particularly those units known to be fossiliferous, and to delineate their respective areal distributions in the project area. Published and unpublished geologic and paleontological literature was reviewed to document the number and locations of previously recorded fossil localities in the project area and the surrounding region from each rock unit exposed in the project area. The types of fossil remains the unit has produced locally and the taxa represented by the remains were also documented. The literature review was supplemented by an archival search done at the Natural History Museum of Los Angeles County (LACM) for additional information on the occurrences of fossil localities in the same stratigraphic units in the project area and the surrounding region, and the types of fossil remains that were recovered at those localities. The University of California Museum of Paleontology (UCMP) on-line collections

database was accessed for similar information. These tasks were done by Dr. E. Bruce Lander, the PEAI principal paleontologist.

A windshield field survey of the entire project area was done on March 22 and 23, 2010, by Mark A. Roeder, the PEAI field supervisor. The survey was done to document the condition of any previously recorded fossil locality therein; the occurrence of any unrecorded fossil locality; and the presence of strata suitable for containing fossil remains. Because most of the project area is underlain by undissected strata and much of it is developed, there is little exposure of the strata underlying the project area. Consequently, only obvious exposures, primarily those in retention basins, were inspected on foot.

The stratigraphic and paleontological resource inventories were used by Dr. Lander in preparing this Paleontological Evaluation Report. Any text on geology was reviewed by Mr. Patrick W. Riseley, the PEAI geologist. As specified in the Caltrans (2011) Standard Environmental Reference, the Paleontological Evaluation Report presents a paleontological resource inventory and evaluation of the project area by underlying rock unit and discusses and assesses the potential environmental impacts of such earth-moving activities in each unit.

2.2 Limitations

Virtually the entire project area is underlain by Recent Alluvial Fan Deposits of the Great Valley, Recent Basin Deposits of the Great Valley, and Recent River and Major Stream Channel Deposits of the Great Valley. At and near the surface, these stratigraphic units are of Holocene age and, as a result, their exposures are comparatively undissected. Moreover, much of the project area is covered by development or agriculture. Consequently, no natural exposure of these rock units with strata old enough to contain fossil remains was observed during the field survey done in support of this Paleontological Evaluation Report. Additionally, roadcuts were also found to be landscaped. Therefore, the survey concentrated on examining human-made exposures in several retention basins, which extended to depths as great as about 35 feet below the previous ground surface.

Section 3 Affected Environment

The project area includes the entire construction footprint where earth-moving activities would occur, plus those parcels to be affected by the project. The construction footprint is surrounded by a buffer zone of approximately 25 feet to allow for the maneuvering of construction vehicles. A topographic map of the project area is presented in Figure 3 at a scale of 1:62,500 (1 inch = 1 mile).

3.1 Regional Geology

The project area lies in the southern San Joaquin Valley, which in turn lies in the northern Central Valley Province, a flat-lying, almost featureless, alluvial plain underlain by up to about 10,000 feet of continental strata of Quaternary (Pleistocene and Holocene) age (Hoots et al. 1954, Jahns 1954, Smith 1964). Locally, low hills on the valley floor reflect folding of underlying strata, and folded Tertiary strata are exposed along the margins of the valley (Hoots et al. 1954, Jahns 1954, Smith 1964). The Quaternary strata consist mostly of comparatively unconsolidated, undisturbed, and undissected deposits of clay, sand, and conglomerate of alluvial fan and lacustrine origin (Hoots et al. 1954, Jahns 1954, Smith 1964). Regional surficial geologic mapping of the southern San Joaquin Valley is provided at a scale of 1:250,000 by Smith (1964).

3.2 Project Area

The project area comprises state and privately owned land. Most of the project area is in the highly urbanized, greater Bakersfield area, most of which has been developed for residential, commercial, and industrial uses.

Topographic map coverage of the project area is provided at scales of 1:250,000 by the United States Geological Survey (USGS) Bakersfield 2-Degree Sheet, 1:100,000 by the United States Geological Survey Taft and Tehachapi 30 X 60 Minute Quadrangles, and 1:24,000 by the United States Geological Survey Gosford, Lamont, Oil Center, and Oildale 7.5-Minute Quadrangles. A topographic map of the project area is included in Figure 3 at a scale of 1:62,500 (1 inch = 1 mile).

The project area is situated on the San Joaquin Valley floor, a comparatively featureless plain that slopes gently in a southwesterly direction to the valley axis, and the northwestern portion of the project area is crossed by Kern River (Figure 3).

3.2.1 Local Geology

Regional surficial geologic mapping by Smith (1964) indicates that the project area is underlain by four sedimentary or stratigraphic rock units, all of continental origin. In ascending stratigraphic order, these stratigraphic units include Pleistocene Nonmarine Sedimentary Deposits, Recent Alluvial Fan Deposits of the Great Valley, Recent Basin Deposits of the Great Valley, and Recent River and Major Stream Channel Deposits of the Great Valley (Wagner 2007). Wagner (2007), however, did not record the presence of the basin deposits in his paleontological resource inventory of the project area. All of these rock units have produced the fossilized remains of mostly extinct, continental vertebrate species of Pleistocene age at numerous, previously recorded fossil localities elsewhere in the San Joaquin Valley (Lander and Harlan 2006).

A surficial geologic map of the project area is included as Figure 7 at a scale of 1:62,500 (1 inch = 1 mile). The geologic base was taken from Smith (1964) because his geologic mapping covers the entire project area and, consequently, presents a consistent portrayal of stratigraphic data. A geologic time scale covering the sedimentary units underlying the project area is presented in Figure 8. Surficial geologic maps of Alternatives A to C are presented at a scale of 1:62,500 (1 inch = 1 mile) in Figures 9 to 11. All four rock units are exposed in each of the three alternatives.

The following information comes from the surficial geologic mapping and accompanying descriptions by Smith (1964). The nonmarine sedimentary deposits comprise dissected alluvial fan deposits that underlie the lower slopes along the eastern margin of the southern San Joaquin Valley. These deposits overlie Pliocene-Pleistocene Nonmarine Sedimentary Deposits and successively older Tertiary marine and continental stratigraphic units that underlie the upper slopes to the northeast, and are succeeded, in turn, by the overlying alluvial fan deposits to the southwest. The latter deposits are undissected and underlie the valley floor. The Quaternary continental rock units were derived from the adjacent Sierra Nevada Mountains to the east.

Locally, erosional remnants of the nonmarine sedimentary deposits protrude through the alluvial fan deposits. The alluvial fan deposits are laterally continuous with the basin deposits, which generally underlie those portions of the valley floor farthest from the Sierra Nevada and the valley margins. Stream channel deposits fill the Kern

River channel, which has incised into the strata underlying the eastern slopes and floor of the valley and crosses the valley in a southwesterly direction (Figure 7).

Pleistocene Nonmarine Sedimentary Deposits

The Pleistocene Nonmarine Sedimentary Deposits (Unit Qc of Smith 1964) consist of older alluvium which, in turn, comprises slightly consolidated and dissected alluvial fan deposits (Smith 1964). However, in the adjacent Fresno 2-Degree Sheet to the north, the nonmarine sedimentary deposits include granitic sand, silt, and clay assigned to the Riverbank Formation by Matthews and Burnett (1965). As mapped by Helley (1966) in the San Jose 2-Degree Sheet, the nonmarine sedimentary deposits include the Turlock Lake Formation and the overlying Riverbank Formation (Rogers 1966). These deposits occur only in a small area near the intersection of SR 58 and Union Avenue near the eastern end of the project area (Figure 7).

Recent Alluvial Fan Deposits of the Great Valley

The Recent Alluvial Fan Deposits of the Great Valley (Unit Qf of Smith 1964) consist of recent sediments deposited by streams emerging from the highlands surrounding the Great Valley (i.e., from the Sierra Nevada to the east) (Smith 1964). However, in the adjacent Fresno 2-Degree Sheet to the north, the alluvial fan deposits include sand and silt assigned to the Modesto Formation by Matthews and Burnett (1965). These deposits underlie most of the project area (Figure 7).

Recent Basin Deposits of the Great Valley

The Recent Basin Deposits of the Great Valley (Unit Qb of Smith 1964) consist of recent sediments deposited during flood stages of major streams between natural stream levees and alluvial fans (Smith 1964). Wagner (2007) did not record the presence of this stratigraphic unit in his paleontological resource inventory of the project area. These deposits occur only at the extreme eastern end of the project area at its intersection with Cottonwood Road (Figure 7).

Recent River and Major Stream Channel Deposits of the Great Valley

The Recent River and Major Stream Channel Deposits of the Great Valley (Unit Qsc of Smith 1964) consist of recent sediments deposited along river channels, major streams, and the adjacent natural levees (Smith 1964). In the project area, these deposits occur only in the Kern River channel (Figure 7).

3.3 Paleontological Resource Evaluation by Fossil Type and Rock Unit

3.3.1 Resource Evaluation Criteria

Caltrans (2011) has developed the following criteria for evaluating the scientific significance of the paleontological resources that would be affected by a construction project.

A fossil specimen is considered scientifically significant if it is: (1) identifiable, (2) complete, (3) well-preserved, (4) age diagnostic, (5) useful in environmental reconstruction, (6) a type or topotypic specimen, (7) a member of a rare species, (8) a species that is part of a taxonomically diverse assemblage, or (9) a skeletal element different from, or a specimen more complete than, those now available for its respective species. Identifiable fossil land mammal remains, for example, are considered scientifically significant because of their potential use in providing accurate age determinations and environmental reconstructions for the sedimentary or stratigraphic rock units in which they occur. The geologic age of some fossil mollusk, land mammal, and plant remains can be determined by carbon-14 dating analysis. Moreover, land mammal and plant remains are comparatively rare in the fossil record.

The paleontologic importance of a stratigraphic unit reflects its potential for containing scientifically significant fossil remains that might be encountered by earth-moving activities in that portion of a project area underlain by that rock unit. This potential paleontological productivity, in turn, reflects the number or density of fossil localities that it contains in the project area and the surrounding region, as well as the number of fossil specimens that have been recovered at these fossils sites.

High Importance—Rock units that, based on previous paleontologic investigations, have been demonstrated to have a high potential for containing scientifically important fossil remains that might be exposed by earth-moving activities are classified as being of high importance.

Pleistocene sediments exposed at the surface or encountered during excavation have a high potential to contain fossils. Similarly, deeper excavation (exceeding five feet below the native or original ground surface) in Holocene deposits has the potential to encounter Pleistocene deposits also. As such, deeper excavation in Holocene deposits would classify those sediments as having high importance for paleontological resources.

Similarly and pending further investigation, a fine-grained stratigraphic unit that is lithologically and temporally similar to other fossiliferous rock units also are classified as being of high importance if it has not been demonstrated by previous paleontologic investigations that the sedimentary unit being evaluated has only a low potential for containing any scientifically important fossil remains that might be exposed by earth-moving activities.

In addition to clastic sedimentary strata (such as shale, siltstone, and sandstone), these rock units also might include those composed of volcanic rocks (such as air-fall tuffs and of low-grade metamorphic rocks).

Low Importance—At and near the surface, Holocene strata probably comprise historic or modern sediments of Recent or latest Holocene age and, therefore, are not likely to contain any remains old enough to be considered fossilized. Coarse-grained sedimentary strata (conglomerates, breccias), because their mode of deposition would have destroyed any remains encountered during deposition, are nearly always unfossiliferous. Therefore, rock units composed of such rocks are considered to have only a low potential for containing any scientifically important fossil remains that might be exposed by earth-moving activities and, correspondingly, are classified as being of low importance.

Similarly, fine-grained stratigraphic units that are lithologically similar to other fossiliferous rock units also are classified as being of low importance if it has been demonstrated by previous extensive paleontologic investigations that they have only a low potential for containing any scientifically important fossil remains that might be exposed by earth-moving activities.

On the other hand, a sedimentary unit containing abundant invertebrate remains representing geographically widely distributed fauna of very limited taxonomic diversity (e.g., a fossilized oyster reef) also would be classified as being of low importance if the fauna and its constituent taxa already were thoroughly studied and documented and were very well represented in museum collections.

No Potential—Intrusive igneous (plutonic) rocks, because of their origin from a molten state deep within the Earth’s crust, are unfossiliferous. Because their modes of deposition and extremely high initial temperatures would have destroyed any remains encountered during deposition, virtually all extrusive igneous rocks (lava flows and ash-flow tuffs or ignimbrites) are nearly always unfossiliferous. Because the high pressures and temperatures that resulted in their

formation would have destroyed any fossil remains, higher-grade metamorphic rocks also are unfossiliferous. Therefore, rock units composed of such rocks are considered to have no potential for containing any scientifically important fossil remains that might be exposed by earth-moving activities and, correspondingly, are classified as being of no importance. Similarly, fossil remains in artificial fill or previously disturbed sediments would have been removed from their original stratigraphic context and, consequently, would be of limited scientific value. For that reason, artificial fill or previously disturbed sediments are also classified as having no importance.

3.3.2 Fossil Occurrences and Resource Evaluations by Rock Unit

The paleontological resource inventory compiled by Wagner (2007) did not document any fossil locality in or near the project area. Consequently, the potential for unrecorded fossil localities being encountered by construction-related earth-moving activities in the stratigraphic units underlying the project area was considered to be low (Wagner 2007). However, the Paleontological Evaluation Report prepared by Lander and Riseley (2008) in support of the nearby SR 99/Hosking Avenue Interchange-New Construction Project documented one previously recorded fossil locality near the project area and indicated that there was a high potential for scientifically significant fossil remains and previously unrecorded fossil localities being encountered by earth-moving activities in one of the same rock units that also underlies the project area. The latter study was based partly on an earlier report by Lander and Harlan (2006) that was prepared in support of the SR 180 Westside Expressway Route Adoption Study Environmental Impact Report (EIR). That study documented the occurrences of numerous previously recorded fossil localities scattered across the San Joaquin and southern Sacramento Valleys and from all four of the sedimentary units underlying the project area. Many of those localities were recorded by Jefferson (1991a, 1991b) and include some of the localities reported earlier by Hay (1927). A paleontologic resource evaluation of each rock unit exposed in the project area is presented below and summarized in Table 1.

Table 1 Paleontological Importance and Impact Sensitivity of Stratigraphic Rock Units in the Centennial Corridor.

Rock Unit	Importance/ Sensitivity	Alternative		
		A	B	C
Qsc (less than 5 feet below surface)	low	X	X	X
Qsc (more than 5 feet below surface)	high	X	X	X
Qb (less than 5 feet below surface)	low	X	X	X
Qb (more than 5 feet below surface)	high	X	X	X
Qf (less than 3 feet below surface)	low	X	X	X
Qf (more than 3 feet below surface)	high	X	X	X
Qc	high	X	X	X

Pleistocene Nonmarine Sedimentary Deposits (Unit Qc)

Jefferson (1991a, 1991b), Dundas et al. (1996, 2011), Lander and Harlan (2006), and Ngo et al. (2011) reported the occurrences of fossilized bones and teeth representing a taxonomic diversity of mostly extinct species of early to middle Pleistocene (Irvingtonian and Rancholabrean) land mammal species from a number of previously recorded fossil localities in the Turlock Lake and Riverbank Formations and from areas underlain by Pleistocene Nonmarine Sedimentary Deposits. The fossil localities in these stratigraphic units are scattered across the San Joaquin and southern Sacramento Valleys, and include the following University of California Museum of Paleontology fossil localities (Jefferson 1991a, 1991b, Lander and Harlan 2006, Dundas et al. 1996):

- Madera County: University of California Museum of Paleontology locality V-93128 (Fairmead Landfill) is 36 to 46 feet below previous grade in the Turlock Lake Formation and yielded the taxonomically highly diverse, continental vertebrate assemblage reported by Dundas et al. (1996, 2011), Asami et al. (2011), Kottachchi et al. (2011), and Ngo et al. (2011). The mostly extinct species represented in the assemblage include Sacramento perches, salamanders, frogs, desert tortoises, Pacific pond turtles, snakes, burrowing owls, Canada geese, common shelduck, scaups?[2], mourning doves, long-tailed shrews, Wheatley's giant ground sloths, Harlan's ground sloths, Shasta ground sloths, jackrabbits, ground squirrels, packrats, deer mice, voles, pocket gophers, kangaroo rats, American badgers, dire wolves, coyotes, swift foxes, short-faced bears, American saber-toothed cats, scimitar-toothed cats, American cheetahs, Columbian mammoths, Scott's horses, peccaries, large-headed llamas, western camels, dwarf pronghorns, four-horned pronghorns, and mule deer (Dundas et al. 1996, 2011,

[2] The "?" next to a species indicates the identifier was not certain of the specimen's identification.

Lander and Harlan 2006, Asami et al. 2011, Kottchchi et al. 2011, Ngo et al. 2011). The remains of snails, clams, and diatoms have also been recovered from the Turlock Lake Formation (Ngo et al. 2011).

- Merced County: University of California Museum of Paleontology locality V-67224 (Riverbank Formation; Jefferson 1991b).
- Sacramento County: University of California Museum of Paleontology localities V-6747, -6846, -68141, -69129, -74086, and -75126 and a Sierra College Natural History Museum fossil locality, all in the Riverbank Formation, yielded remains representing carps?, bullfrogs, Pacific pond turtles, garter snakes, waterfowl, broad-footed moles, Harlan's ground sloths, cottontails, Beechey's tree squirrels?, ground squirrels, harvest mice, packrats, voles, Botta's pocket gophers, pocket mice, kangaroo rats, dire wolves, coyotes, Columbian mammoths, horses, western camels, mule deer, pronghorns?, and antique bison, as well as the remains of holly-leaf cherries (Jefferson 1991a, 1991b, unpublished data, Hilton et al. 2000, Lander and Harlan 2000, G.T. Jefferson unpublished data).
- San Joaquin County: University of California Museum of Paleontology locality V-66150 in the Riverbank Formation yielded the remains of Jefferson's ground sloth (Jefferson 1991b).
- Stanislaus County: University of California Museum of Paleontology localities V-4807, -4808, -4809, -4810, -4811, -4819, and -72008 are in the Riverbank Formation and yielded the remains of Harlan's ground sloths, pocket gophers, American mastodons, mammoths, and horses (Reiche 1950, Jefferson 1991b, Lander and Harlan 2006). University of California Museum of Paleontology locality V-5434 produced camel and bison remains (Jefferson 1991b) and is in the Pleistocene Nonmarine Sedimentary Deposits, the Recent Alluvial Fan Deposits of the Great Valley, the Recent Basin Deposits of the Great Valley, or the Recent River and Major Stream Channel Deposits of the Great Valley, all of which are exposed in the area of the fossil locality.
- Tulare County: University of California Museum of Paleontology localities V-4903 and -78124 are in the Pleistocene Nonmarine Sedimentary Deposits and yielded mammoth remains (Jefferson 1991b, Lander and Harlan 2006). University of California Museum of Paleontology localities V-3931, -65309, and -6837 are either in this stratigraphic unit, the Recent Alluvial Fan Deposits of the Great Valley, the Recent Basin Deposits of the Great Valley, or the Recent River and Major Stream Channel Deposits of the Great Valley, two or more of which are exposed in the area of each fossil locality (Lander and Harlan 2006). These latter localities produced the remains of horse and western camel (Jefferson 1991b).

The fossil remains from the nonmarine sedimentary deposits are scientifically important because they have allowed the documentation of the early to middle Pleistocene (Irvingtonian and Rancholabrean) age of these deposits and the paleoenvironmental reconstruction of the San Joaquin Valley during this time interval (Figure 8). The Rancholabrean North American Land Mammal Age (NALMA) is defined by the first appearance of bison, which is lacking in the preceding Irvingtonian NALMA (Savage 1951). The occurrence of a number of previously recorded fossil localities in the nonmarine sedimentary deposits in the San Joaquin suggests that there is a high potential for similar fossil remains being encountered by earth-moving activities where the project area is underlain by this sedimentary unit. Therefore, the rock unit is regarded as paleontologically highly important.

Recent Alluvial Fan Deposits of the Great Valley (Unit Qf)

Jefferson (1991b), Lander and Harlan (2006), and Lander and Riseley (2008) reported the occurrences of fossilized bones and teeth representing a taxonomic diversity of extinct species of middle to late Pleistocene (Rancholabrean) land mammal species from a number of previously recorded fossil localities in the Modesto Formation and from areas underlain by the Recent Alluvial Fan Deposits of the Great Valley. The fossil localities in the alluvial fan deposits are scattered across the San Joaquin Valley and include the following Natural History Museum of Los Angeles County and University of California Museum of Paleontology fossil localities (Jefferson 1991b, Lander and Harlan 2006, Lander and Riseley 2008):

- Kern County: Two previously recorded fossil localities that occur in the immediate vicinity of the project area and are in the Recent Alluvial Fan Deposits of the Great Valley or the Recent Basin Deposits of the Great Valley. University of California Museum of Paleontology locality V-65247 was found during excavation of the Bakersfield Canal and yielded fossilized remains representing the extinct western horse (Jefferson 1991b, Lander and Riseley 2008). University of California Museum of Paleontology locality V-93068 was found 25 to 28 feet below the previous ground surface at the Arvin Landfill and yielded bones and teeth representing Pleistocene or Holocene continental vertebrates, including tree frogs, lizards, rabbits, pocket gophers, kangaroo rats, packrats, voles, and canids (Fay and Thiessen 1993). Neither locality was reported by Wagner (2007) in his paleontological resource inventory of the project area, and University of California Museum of Paleontology locality V-93068 was not recorded by Lander and Riseley (2008).

- Fresno County: University of California Museum of Paleontology locality V-65100 is in the alluvial fan deposits or the Recent Basin Deposits of the Great Valley, both of which are exposed in the area of the fossil locality. This locality produced camel remains (Jefferson 1991b).
- Madera County: Natural History Museum of Los Angeles County locality 7254 yielded elephant remains (Jefferson 1991b).
- Merced County: University of California Museum of Paleontology locality V-3720 produced bison remains (Jefferson 1991b).
- San Joaquin County: University of California Museum of Paleontology locality V-66150 yielded the remains of Jefferson's ground sloth (Jefferson 1991b).
- Stanislaus County: University of California Museum of Paleontology localities V-3107 and -3959 produced horse remains, whereas University of California Museum of Paleontology localities V-72007, -72186, -81119, and -81120 were in the Modesto Formation and yielded the remains of Jefferson's ground sloth, Columbian mammoth, western camel, possibly antique bison, and longhorn bison (Jefferson 1991b). Two of these localities were encountered at depths only 3 to 4 feet below the former ground surface. Mammoth remains were recovered from the Modesto Formation at the Modesto Sanitary Landfill (G.T. Jefferson unpublished data). Additional fossil land mammal remains also were recovered at University of California Museum of Paleontology locality V-87045 (Lander and Harlan 2006) and bison remains were found at University of California Museum of Paleontology locality V-87046.
- Tulare County: The remains of elephant, horse, and camel were recovered at University of California Museum of Paleontology locality V-5568, whereas horse remains were found at University of California Museum of Paleontology locality V-69173 (Jefferson 1991b, Lander and Harlan 2006).

The fossilized remains from the alluvial fan deposits are scientifically significant because they have allowed the documentation of the middle to late Pleistocene (Rancholabrean) age for the older portion of these deposits at depths as shallow as 3 to 4 feet below the present ground surface (Figure 8), and the paleoenvironmental reconstruction of the San Joaquin Valley during this time interval. Although considered to be entirely of Holocene age by Jennings and Strand (1958), Smith (1964), Matthews and Burnett (1965), and Rogers (1966), the occurrences of Rancholabrean fossil land mammal remains indicate that the alluvial fan deposits also are partly middle to late Pleistocene in age. Because the alluvial fan deposits are considered to be Holocene in age at the surface, the fossil localities yielding extinct

species of land mammals probably were all encountered in the subsurface. The occurrence of a number of previously recorded fossil localities in the alluvial fan deposits in the San Joaquin Valley suggests that there is a high potential for similar fossilized remains being encountered by earth-moving activities at depths only 3 to 4 feet below the present ground surface where the project area is underlain by this stratigraphic unit. Therefore, the rock unit is regarded as paleontologically highly important at depths at least 3 feet below the surface. However, at shallower depths, there probably is no more than a low potential for encountering remains old enough to be considered fossilized. Consequently, this sedimentary unit is considered to be only of low paleontological importance at depths less than 3 feet below the present ground surface.

Recent Basin Deposits of the Great Valley (Unit Qb)

Jefferson (1991a, 1991b) and Lander and Harlan (2006) reported the occurrences of fossilized bones and teeth representing a taxonomic diversity of extinct species of middle to late Pleistocene (Rancholabrean) continental vertebrate species from a number of fossil localities in areas underlain by the Recent Basin Deposits of the Great Valley. The fossil localities in the basin deposits are scattered across the San Joaquin Valley and include the following University of California Museum of Paleontology fossil localities (Jefferson 1991a, 1991b, Lander and Harlan 2006):

- Kern County: Two previously recorded fossil localities that occur in the immediate vicinity of the project area are in the Recent Basin Deposits of the Great Valley or the Recent Alluvial Fan Deposits of the Great Valley. University of California Museum of Paleontology locality V-65247 was found during excavation of the Bakersfield Canal and yielded fossilized remains representing an extinct species of western horse (Jefferson 1991b, Lander and Riseley 2008). University of California Museum of Paleontology locality V-93068 was found 25 to 28 feet below the previous ground surface at the Arvin Landfill and yielded bones and teeth representing Pleistocene or Holocene continental vertebrates, including tree frogs, lizards, rabbits, pocket gophers, kangaroo rats, packrats, voles, and canids (Fay and Thiessen 1993). Neither locality was reported by Wagner (2007) in his paleontological resource inventory of the project area, and University of California Museum of Paleontology locality V-93068 was not recorded by Lander and Riseley (2008).
- Fresno County: University of California Museum of Paleontology locality V-4401 produced the remains of freshwater fishes, pacific pond turtle, rattlesnakes, loons, broad-footed moles, jack rabbits, pocket gophers, packrats, voles, American

badgers, red and gray foxes, coyotes, western camels, mule deer, elk, and bison (Jefferson 1991a, 1991b).

- University of California Museum of Paleontology locality V-65100 is in the Recent Basin Deposits of the Great Valley or the Recent Alluvial Fan Deposits of the Great Valley, and yielded camel remains (Jefferson 1991b).
- San Joaquin County: University of California Museum of Paleontology locality V-5107 produced the remains of carnivores, Columbian mammoths, and horses (Jefferson 1991b).
- Stanislaus County: University of California Museum of Paleontology locality V-5434 produced camel and bison remains (Jefferson 1991b) and is in the Pleistocene Nonmarine Sedimentary Deposits, the Recent Alluvial Fan Deposits of the Great Valley, the Recent Basin Deposits of the Great Valley, or the Recent River and Major Stream Channel Deposits of the Great Valley, all of which are exposed in the area of the fossil locality.

The fossilized remains from the basin deposits are scientifically significant because they have allowed the documentation of the middle to late Pleistocene (Rancholabrean) age for the older portion of these deposits (Figure 8), and the paleoenvironmental reconstruction of the San Joaquin Valley during this time interval. Although considered to be entirely of Holocene age by Jennings and Strand (1958), Smith (1964), Matthews and Burnett (1965), and Rogers (1966), the occurrences of Rancholabrean fossil land mammal remains indicate that the basin deposits also are partly middle to late Pleistocene in age. Because the basin deposits are considered to be Holocene in age at the surface, the fossil localities yielding remains representing extinct species of land mammals probably were all encountered in the subsurface. The occurrence of at least two previously recorded fossil localities in the basin deposits in the San Joaquin Valley suggests that there is a potential for similar fossilized remains being encountered by earth-moving activities at depths perhaps only five feet below the present ground surface where the project area is underlain by this sedimentary unit. Therefore, the rock unit is regarded as paleontologically highly important at depths at least five feet below the surface. However, at shallower depths, there probably is no more than a potential for encountering remains old enough to be considered fossilized. Consequently, this sedimentary unit is considered to be only of low paleontological importance at depths less than five feet below the present ground surface.

Recent River and Major Stream Channel Deposits of the Great Valley (Unit Qsc)

Only one fossil locality reported by Jefferson (1991b) and Lander and Harlan (2006) definitely occurs in an area underlain by the Recent River and Major Stream Channel Deposits of the Great Valley. This locality, University of California Museum of Paleontology V-6806 from Merced County in the San Joaquin Valley, yielded the fossilized remains of Harlan's ground sloth and horse (Jefferson 1991b, Lander and Harlan 2006). Although considered to be entirely of Holocene age by Jennings and Strand (1958), Smith (1964), and Matthews and Burnett (1965), the occurrences of Rancholabrean fossil land mammal remains indicate that the channel deposits also are partly middle to late Pleistocene in age.

University of California Museum of Paleontology locality V-5434 in Stanislaus County is in the Recent River and Major Stream Channel Deposits of the Great Valley, the Pleistocene Nonmarine Sedimentary Deposits, the Recent Alluvial Fan Deposits of the Great Valley, or the Recent Basin Deposits of the Great Valley, all of which are exposed in the area of the fossil locality. This locality yielded the fossilized remains of camel and bison (Jefferson 1991b, Lander and Harlan 2006).

The fossilized remains from the channel deposits are scientifically important because they have allowed the documentation of the middle to late Pleistocene (Rancholabrean) age for the older portion of these deposits (Figure 8), and the paleoenvironmental reconstruction of the San Joaquin Valley during this time interval. Although considered to be entirely of Holocene age by Jennings and Strand (1958), Smith (1964), Matthews and Burnett (1965), and Rogers (1966), the occurrences of Rancholabrean fossil land mammal remains indicate that the channel deposits also are partly middle to late Pleistocene in age. Because the channel deposits are considered to be Holocene in age at the surface, the fossil localities yielding remains representing extinct species of land mammals probably were all encountered in the subsurface. The definite occurrence of one or two previously recorded fossil locality in the channel deposits of the San Joaquin Valley suggests that there is a potential for similar fossilized remains being encountered by earth-moving activities at depths perhaps only five feet below the present ground surface where the project area is underlain by this sedimentary unit. Therefore, the rock unit is regarded as paleontologically highly important at depths at least five feet below the surface. However, at shallower depths, there probably is no more than a potential for encountering remains old enough to be considered fossilized. Consequently, this

sedimentary unit is considered to be only of low paleontological importance at depths less than five feet below the present ground surface.

Section 4 Environmental Consequences

Excavation and other earth-moving activities associated with the project would have the potential for affecting scientifically significant paleontological resources, including previously unrecorded fossil localities and remains, particularly in the subsurface; associated specimen data and corresponding geologic and geographic locality data; and the fossil-bearing strata. The disturbance or loss of these resources as a result of such activities would be an adverse environmental impact.

There would be no impact as a result of the No-Build Alternative because there would be no earth-moving activity that might disturb paleontologic resources.

4.1 Construction-Related Impacts

4.1.1 Formations that Might be Affected

Surficial geologic mapping by Smith (1964) indicates that the project area is underlain by four sedimentary or stratigraphic rock units that may contain scientifically significant paleontological resources that could be adversely affected by construction-related impacts. In ascending stratigraphic order, the stratigraphic units that could be affected include Pleistocene Nonmarine Sedimentary Deposits, Recent Alluvial Fan Deposits of the Great Valley, Recent Basin Deposits of the Great Valley, and Recent River and Major Stream Channel Deposits of the Great Valley (Figure 7). All four sedimentary units have yielded fossilized bones and teeth representing extinct species of Irvingtonian and Rancholabrean (early to late Pleistocene) land mammals (Figure 8). Therefore, these rock units would be considered sensitive to such adverse impacts.

The impact sensitivity of a stratigraphic unit is regarded as corresponding to its paleontological importance. Therefore, a sedimentary unit of high paleontological importance would be considered highly sensitive to the impacts accompanying project-related earth-moving activities because of the correspondingly high potential for the disturbance or loss of paleontological resources. An impact sensitivity assessment of each rock unit exposed in the project area is summarized in Table 1.

4.1.2 Project-Related Work that Might Affect Paleontological Resources

Project-related earth-moving activities would potentially adversely affect paleontological resources. Such earth-moving activities would include excavation for those segments of roadways that would be below current grade, particularly with

regard to Alternative B and, to a lesser extent, Alternative C; auguring for bridge and overpass supports for segments of roadways that would be above grade, particularly with respect to Alternative C; excavation of retention basins; and trenching for pipelines and culverts (Figures 9 to 11).

Excavation for roadways would reach depths up to 25 feet below the current ground surface. The impact of earth-moving activities would be greatest under Alternative B, in which the most sediment in the Recent Alluvial Fan Deposits of the Great Valley would be disturbed by earth-moving activities, particularly with regard to excavation for roadways that would be below current grade (Figure 10). Correspondingly, the impact of such excavation would be less with Alternative C and least for Alternative A (Figures 9, 11).

On the other hand, fossil remains would not be uncovered without these earth-moving activities and therefore would never be available for recovery and future scientific study by paleontologists. With the implementation of appropriate mitigation measures providing for the recovery and treatment of any scientifically significant fossil remains exposed by such activities, adverse impacts resulting from the project would be reduced to a less than significant level.

4.1.3 Land Ownership and Permits Required

The project area does not include any federal land. Therefore, no BLM Cultural Resource Use Permit or Field Use Authorization allowing the recovery of fossil remains would be required. No permit would be required by any state or local agency with jurisdiction over nonfederal land in the project area.

Property acquisition would be required as part of the project. However, because project-related earth-moving activities would occur only in the construction footprint and not on private land, permission to recover fossil remains would not be required of any private property owner. Caltrans would have to ensure that any scientifically significant fossil remains recovered as a result of mitigation conducted in support of the project would be transferred to a designated museum repository near the project area and that funding would be available for fossil treatment after construction were completed.

4.2 Cumulative Impacts

4.2.1 Related Projects

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of the project. A cumulative effects assessment looks at the collective impacts posed by individual land use plans and projects. Cumulative impacts can result from individually minor, but collectively substantial, impacts taking place over a period of time.

Cumulative impacts on resources of the project area might result from residential, commercial, industrial, and highway development, as well as from agricultural development and the conversion to more intensive types of agricultural cultivation. This impact analysis considers known projects identified on the cumulative projects map maintained by the City of Bakersfield. In addition, the long-term growth projections for the region are used because they provide for future projects that would contribute to potential cumulative impacts for the project design year (2038). In addition to development projects, there are other circulation improvements that might contribute to cumulative impacts. Both the Thomas Roads Improvement Program projects and projects assumed under the Regional Traffic Impact Fee Program are included as part of the cumulative analysis. The California High-Speed Rail system would also cross through the study area.

Each of the cumulative projects has been or will be documented in its own environmental document. The following projects have the greatest potential to contribute to cumulative impacts:

- The Bakersfield Commons Project (GPA/ZC 06-1877) is a 255-acre project located east and west of Coffee Road between Brimhall Road and SR 58 (Rosedale Highway). The City of Bakersfield approved the General Plan Amendment and zone change in August 2010. The Bakersfield Commons project allows 1,400,000 square feet of retail commercial, 600,000 square feet of office commercial, 345 multi-family homes, and 80 single-family homes.
- A General Plan amendment and zone change were approved for the 564-acre Stockdale Ranch Project in June 2010. The project site, which is on the southern side of Stockdale Highway near Heath Road, will be annexed to the City of Bakersfield. The project provides for 3,583 residential units and 941,700 square feet of commercial/business park uses. Twenty acres are provided for open space-park use.

- A General Plan amendment and zone change were approved for the 323-acre Saco Ranch Commercial Center Project in August 2010. The project is located in the northwestern portion of Bakersfield, generally southeast and southwest of the intersection of Coffee Road and 7th Standard Road and west of the Union Pacific Railroad. The project would allow for approximately 1,459,500 square feet of retail commercial uses, 332,000 square feet of office uses, and 1,376,496 square feet of industrial uses. Full build-out is expected in 2030.
- The Crossroads Plaza Commercial Center Project sits in the southern portion of Bakersfield on the west side of Gosford Road, between Panama Lane and Harris Road. The project, on 75 net acres, would allow for development of a retail store (approximately 138,621 square feet, with 10,817 square feet containing a garden center), restaurants (42,741 square feet), and a community retail center (605,008 square feet, with 26,568 square feet containing a garden center). Discretionary actions included a Tentative Parcel Map and Site Plan Review. The project was approved in December 2010.
- The Regional Traffic Impact Fee Program requires new development to pay a proportionate share of the cost for new and expanded transportation facilities. The program includes a range of local street improvements designed to relieve traffic congestion. These improvements, which would be built through 2035, include the widening of several north-south roadways that cross SR 58, particularly in the western portion of the study area.
- The California High-Speed Rail system proposes the construction of over 800 miles of track that would connect major population centers. The proposed system is divided into nine segments. One of the first segments proposed for construction would be in the Central Valley between Fresno and Bakersfield. The California High-Speed Rail environmental document evaluated alignment alternatives for the Fresno-to-Bakersfield segment. A California High-Speed Rail station is proposed for downtown Bakersfield near the existing train station. In this area, two potential alternative alignments are proposed. Alternatives D1-S and D2-N were evaluated in the Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) and both feature a station location consistent with the preferred Bakersfield station location in downtown Bakersfield near Truxtun Avenue near the existing Amtrak station. The station platform for Alternative D1-S would be elevated over the BNSF Railway mainline. For Alternative D2-N, the elevated station platform would be in the Mill Creek Redevelopment area just south of the BNSF Railway right-of-way. The Draft Environmental Impact

Report/Environmental Impact Statement was circulated for public review from August 15, 2011 to September 28, 2011.

- The SR 178/Fairfax Road Interchange Project built an interchange at SR 178 and Fairfax Road and added an additional eastbound and westbound lane to SR 178 in the project area. The project also widened Fairfax Road through the state right-of-way and built a soundwall along the residential area in the northwestern quadrant of the project area. Work began on October 15, 2007 and was completed in 2009.
- The Mohawk Street Extension Project is a 1.2-mile-long, six-lane, north-south arterial from Rosedale Highway to Truxtun Avenue. The project built bridges over the BNSF Railway, the future Westside Parkway, and Kern River. A box culvert was also built for Mohawk Street to cross over the Cross Valley Canal. Construction of the Mohawk Street Extension began in summer 2009 and was completed in the winter of 2011. The project added a traffic signal at the Rosedale Highway/Mohawk Street intersection in September 2009 to facilitate construction, including the import of more than 38,500 truckloads of fill dirt totaling 500,000 cubic yards. Improvements to the Mohawk Street/Truxtun Avenue intersection included signal modifications and access to the new roadway.
- The SR 99/7th Standard Road Interchange Project widened 7th Standard Road in the project area, built a separate parallel bridge next to and north of the existing bridge crossing SR 99, changed on- and off-ramps, and built an overpass for 7th Standard Road over the Union Pacific Railroad. Construction began May 6, 2008 and was completed in 2010.
- The proposed North Beltway Project will widen 7th Standard Road from the existing two-lane road to a four-lane expressway from Coffee Road to I-5. The project includes the construction of new bridges over the Calloway, Friant-Kern, and Lerdo Canals. The project also includes a grade separation at the BNSF Railway near Santa Fe Way.
    - Phase I of this project is complete and involved construction of a four-lane roadway from the William M Thomas Terminal at Meadows Field Airport to SR 99. This project was completed in spring 2008.
    - Phase II of the project improvement is also complete and comprised widening the existing two-lane roadway to arterial standards, and included construction of curbs, gutters, sidewalks, and drainage systems. Traffic signals at the Golden State Avenue and Saco Road intersections and a signal modification at Coffee Road were installed. A grade separation over the Union Pacific Railroad and an overpass at SR 99 were built. Changes to the existing

northbound off-ramp were made and a new northbound on-ramp was built in the state right-of-way.

  - Phase III of the project was completed in spring 2011 and included widening about 6 miles of 7th Standard Road from Coffee Road to Zachary Road. This phase widened 7th Standard Road from two to four lanes and added a median strip. Also included in this phase was the construction of new bridges over the Lerdo, Friant-Kern, and Calloway Canals.
  - Phase IV of the project extended the project westward over the BNSF Railway tracks at Santa Fe Way. A grade separation (bridge) was built at Santa Fe Way. This phase is complete.
  - Phase V of the project will continue the widening to Interstate 5 to complete the corridor. Phase V is awaiting funding.

- The 24th Street Project proposes to make improvements to the Oak Street/24th Street intersection and widen 24th and 23rd Streets (SR 178) from SR 99 to M Street. Conceptual engineering and environmental studies are complete. The draft environmental document is expected to be circulated in early 2012, with approval of the final environmental document expected in early 2013. The project will then be designed, with construction slated to begin in early-2014.
- The Hageman Flyover Project would build a roadway across SR 99 to connect Hageman Road with SR 204 (Golden State Avenue). A Project Study Report has been completed, and preliminary design and environmental studies are underway. The draft environmental document is expected to be circulated in mid 2012, with the final environmental document to be completed in early 2013.
- The SR 178 at Morning Drive Interchange Project would build a new interchange at SR 178 and Morning Drive and widen SR 178 to four lanes for about 1.5 miles. Approval of the final environmental document occurred in September 2011. Final design is underway and is expected to be completed in fall 2012. Construction is expected to begin in late 2012.
- The SR 178 Widening Project would widen SR 178: to four lanes from Masterson Street to Miramonte Drive and to six lanes from Canteria Drive to Masterson Street. The project includes signal modifications at Canteria Drive, Alfred Harrell Highway, Masterson Street, and Miramonte Drive. Preliminary alignment studies and environmental technical studies are completed. The draft environmental document has been circulated for public review and approval of the final environmental document is expected in mid 2012. Final design is expected to start in late 2012 and end in late 2013 with construction anticipated to begin in late 2013.

- The Rosedale Highway Project would widen Rosedale Highway to a six-lane roadway from Allen Road to SR 99. The draft environmental document includes clearance for a grade separation at the railroad crossing near Landco Drive. Construction of the grade separation is to be funded through the City of Bakersfield's Transportation Impact Fee program. The draft environmental document has been circulated for public review. Approval of the final environmental document is expected in fall 2012, and construction is expected to begin in mid-2014.
- The West Beltway Project would build a six-lane north-south roadway extending from SR 119 to 7th Standard Road and potentially include 10 intersections/ interchanges. The initial phase of the project would build an expressway along a portion of the alignment. Construction of the project depends on future development and available funding.

4.2.2 Cumulative Effects on Paleontological Resources

Caltrans builds highways and ancillary structures at project sites throughout the San Joaquin Valley. In addition, as noted above, other jurisdictions have approved land use and transportation projects in the area. Many of these projects require excavation of Quaternary fossil-bearing strata similar to those in the project area. Although individual construction projects usually affect only comparatively small volumes of sediment and sedimentary rock, the combination of Caltrans and other construction projects has a potential for affecting substantial volumes of fossil-bearing sediment. Excavation and other earth-moving activities in two or more project areas in the same region and underlain by the same stratigraphic unit would have the potential for contributing to cumulative impacts if they resulted in the progressive loss of or access to exposures of the rock unit that could be prospected for fossil remains.

On the other hand, fossil remains would not be uncovered without these earth-moving activities and therefore would never be available for recovery and future scientific study by paleontologists. With implementation of appropriate mitigation measures providing for the recovery and treatment of any scientifically significant fossil-remains exposed by such activities, adverse cumulative impacts resulting from the project would be minimized.

Section 5 Preliminary Paleontological Mitigation Measures

The Paleontological Evaluation Report presented above has determined that the project area is underlain by highly sensitive, fossil-bearing, stratigraphic rock units. There would be a correspondingly high potential for scientifically significant fossil remains and previously unrecorded fossil localities being disturbed by or lost to construction-related earth-moving activities where the project area was underlain by these sedimentary units. Consequently, it will be necessary for a comprehensive Paleontological Mitigation Plan to be prepared, as prescribed in the Caltrans (2011) Standard Environmental Reference. The Standard Environmental Reference requires that site-specific paleontological mitigation measures be provided in the Paleontological Mitigation Plan and that the measures be based on the underlying rock unit and the type and magnitude of earth-moving activities to be implemented in those areas underlain by the stratigraphic unit.

5.1 Introduction

For adequate mitigation of potentially adverse effects on paleontological resources to be provided, a Paleontological Mitigation Plan would be prepared and implemented for the project. The purpose of the Paleontological Mitigation Plan is to provide for the preservation of a representative sample of the scientifically significant fossil remains that might be exposed by construction-related earth-moving activities in the project area (Figure 3). The Paleontological Mitigation Plan would be implemented in those areas where earth-moving activities would encounter previously undisturbed strata in Pleistocene Nonmarine Sedimentary Deposits, Recent Alluvial Fan Deposits of the Great Valley, Recent Basin Deposits of the Great Valley, and Recent River and Major Stream Channel Deposits of the Great Valley. All of these rock units are considered to have a high potential for containing scientifically significant fossil remains that might be exposed by such activities (Figure 7, Table 1). Although monitoring will be conducted on a full-time basis in all of those areas, monitoring might be reduced to part time or spot checking in areas underlain by Recent River and Major Stream Channel Deposits of the Great Valley if no fossil remains have been discovered.

The Paleontological Mitigation Plan would not be implemented at depths less than three feet in those areas underlain by Recent Alluvial Fan Deposits of the Great Valley and five feet in areas underlain by Recent Basin Deposits of the Great Valley or in areas underlain by the Recent River and Major Stream Channel Deposits of the Great Valley because the respective strata are judged to be too young to contain remains old enough to be considered fossilized.

The Paleontological Mitigation Plan would substantially reduce the impact of earth-moving activities on the scientifically significant paleontologic resources of the project area by allowing for the recovery of fossil remains and associated data that otherwise would have been lost to these activities.

The Paleontological Mitigation Plan would be prepared in compliance with Caltrans (2011) paleontological mitigation guidelines and with SVP (2010) standard procedures for mitigating construction-related impacts on scientifically significant paleontological resources. The plan would also be prepared for museum acceptance of a mitigation program fossil collection.

5.2 Paleontological Mitigation Commitments

Paleontological mitigation commitments for the Centennial Corridor project will include:

1. Specifications for paleontological mitigation shall be included in the construction contract special provisions section for this project to advise the construction contractor of the requirement to cooperate with the salvage of paleontological resources, particularly fossil remains and associated locality data.

2. A qualified Principal Paleontologist approved by Caltrans will prepare a detailed Paleontological Mitigation Plan prior to the start of construction. The Paleontologist will have a M.S. or Ph.D. degree in paleontology or geology and will be familiar with paleontological salvage or mitigation procedures and techniques. All geologic work will be performed under the supervision of a California Professional Geologist.

3. The State will perform paleontological monitoring and salvage during construction operations or related activities involving subsurface disturbance on this project. Within the boundaries of the project area, no construction or related activities, which may involve subsurface disturbance, are allowed without written

authorization of the Engineer. The State will provide a Paleontological Salvage Team consisting of a State contracted qualified Principal Paleontologist and Paleontological Monitors. The Engineer will make arrangements for the Paleontological Salvage Team to be at the job site.

4. If unanticipated fossils are discovered in an area of the project site not being actively monitored, the remains shall not be disturbed. All work within a 60-foot radius of the discovery will stop, the area will be protected and the Engineer will be notified. The Department will investigate and modify the dimensions of the protected area if necessary. Paleontological resources will not be removed from the job site without authorization. Work will not resume within the specified radius of the discovery until authorized.

5. There will be 15 days notification to the paleontological salvage team in advance of the start of subsurface disturbing operations.

6. The construction contractor will attend a pre-construction meeting with the Paleontological Salvage Team and the Engineer to establish procedures for cooperation and provide for worker safety during monitoring and salvage activities. The Principal Paleontologist and Caltrans Paleontology Coordinator will be present at pre-grading meetings to consult with grading and excavation contractors.

7. Before any earth-moving activity, the Principal Paleontologist shall conduct an employee environmental awareness training session for all persons involved in that earth-moving activity.

8. Prior to the start of earth-moving activities the Paleontological Salvage Team will conduct a preconstruction field survey of the project area and any exposed fossil remains will be recovered. A qualified Paleontological Monitor under the direction of the Principal Paleontologist will be on site to inspect cuts for fossils at all times during original grading involving sensitive geologic formations. If necessary, additional personnel will be assigned to recover unusually large or numerous fossils.

9. The Paleontological Salvage Team will monitor and salvage appropriate fossil specimens identified during excavation. Members of the Paleontological Salvage Team may temporarily divert or stop construction operations in the vicinity of a paleontological find or notify of the need to avoid disturbing a site pending

removal of the specimens. When fossils are discovered, the paleontology monitor will recover them and contact a Principal Paleontologist for assistance. Construction work in these areas will be halted or diverted to allow recovery of fossil remains in a timely manner.

10. Bulk sediment or rock samples will be recovered from fossiliferous horizons and processed to allow for the recovery of microvertebrate and other microfossil remains, as determined necessary by the Principal Paleontologist.

11. Fossil remains collected during the monitoring and salvage portion of the mitigation program will be cleaned, prepared, sorted, and cataloged. Recovered specimens will be prepared and identified by appropriate paleontology specialists.

12. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, will then be deposited in a Caltrans approved scientific institution with paleontological collections and made available for future scientific study.

13. A final report will be completed that outlines the results of the mitigation program and will be signed by the Principal Paleontologist and Professional Geologist. A copy of the report will be supplied to the museum repository and to Caltrans.

14. At the completion of the project, the Caltrans Paleontology Coordinator will prepare a paleontology stewardship summary with a list of any long term commitments. The list will be provided to both Maintenance and Operations staff, including the Encroachment Permits Office.

5.3 Collecting Permits and Coordination

The project area does not include any federal land. Therefore, no BLM Cultural Resource Use Permit or Field Use Authorization regarding the recovery of fossil remains would be required before implementation of the Paleontological Mitigation Plan, nor would any other similar federal agency permit or authorization be needed. No such permit would be required by any state or local agency with jurisdiction over nonfederal land in the project area.

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Appendix A Maps of Centennial Corridor Project Area and Geologic Time Scale

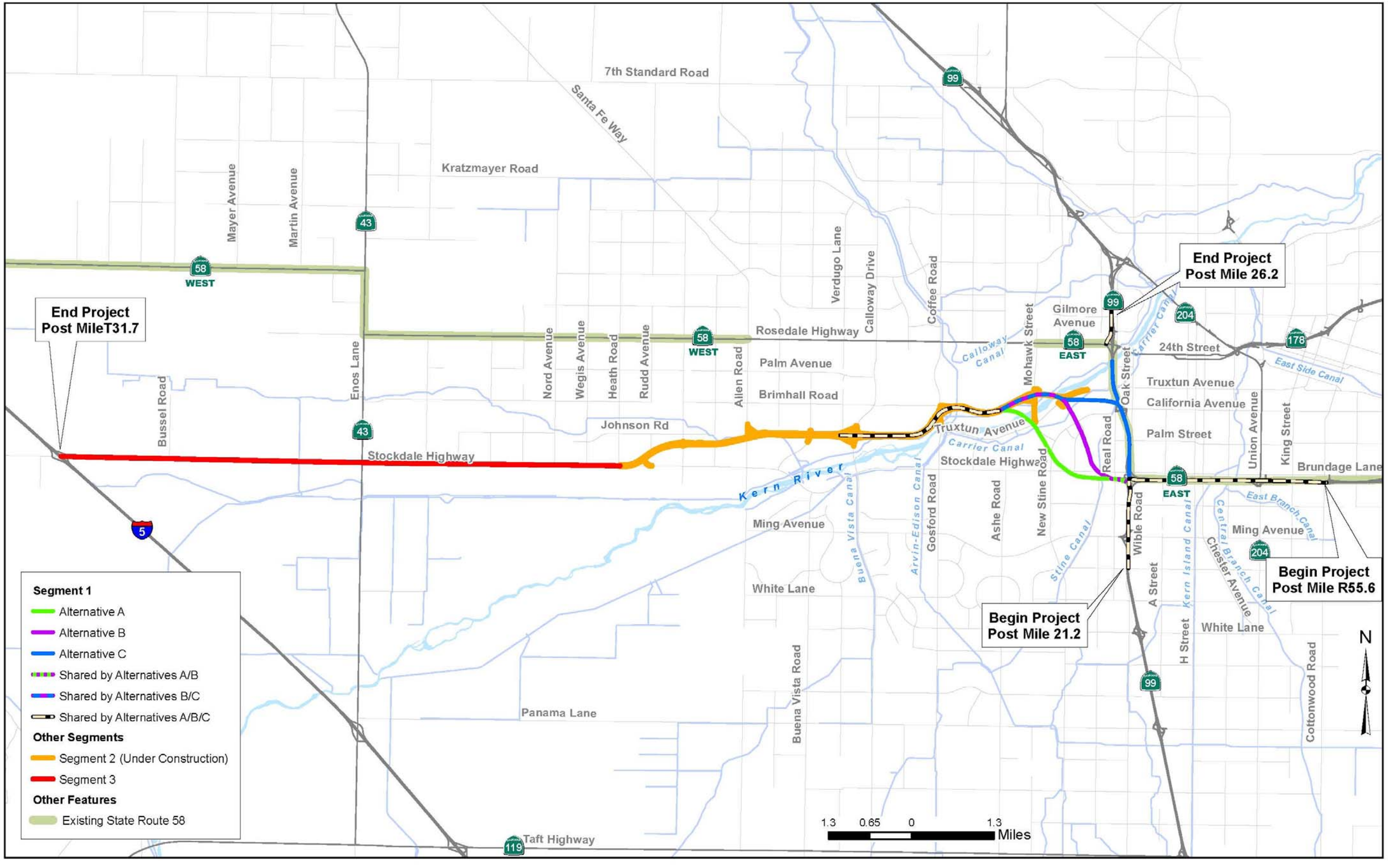

Figure 1.—Segments of the Centennial Corridor

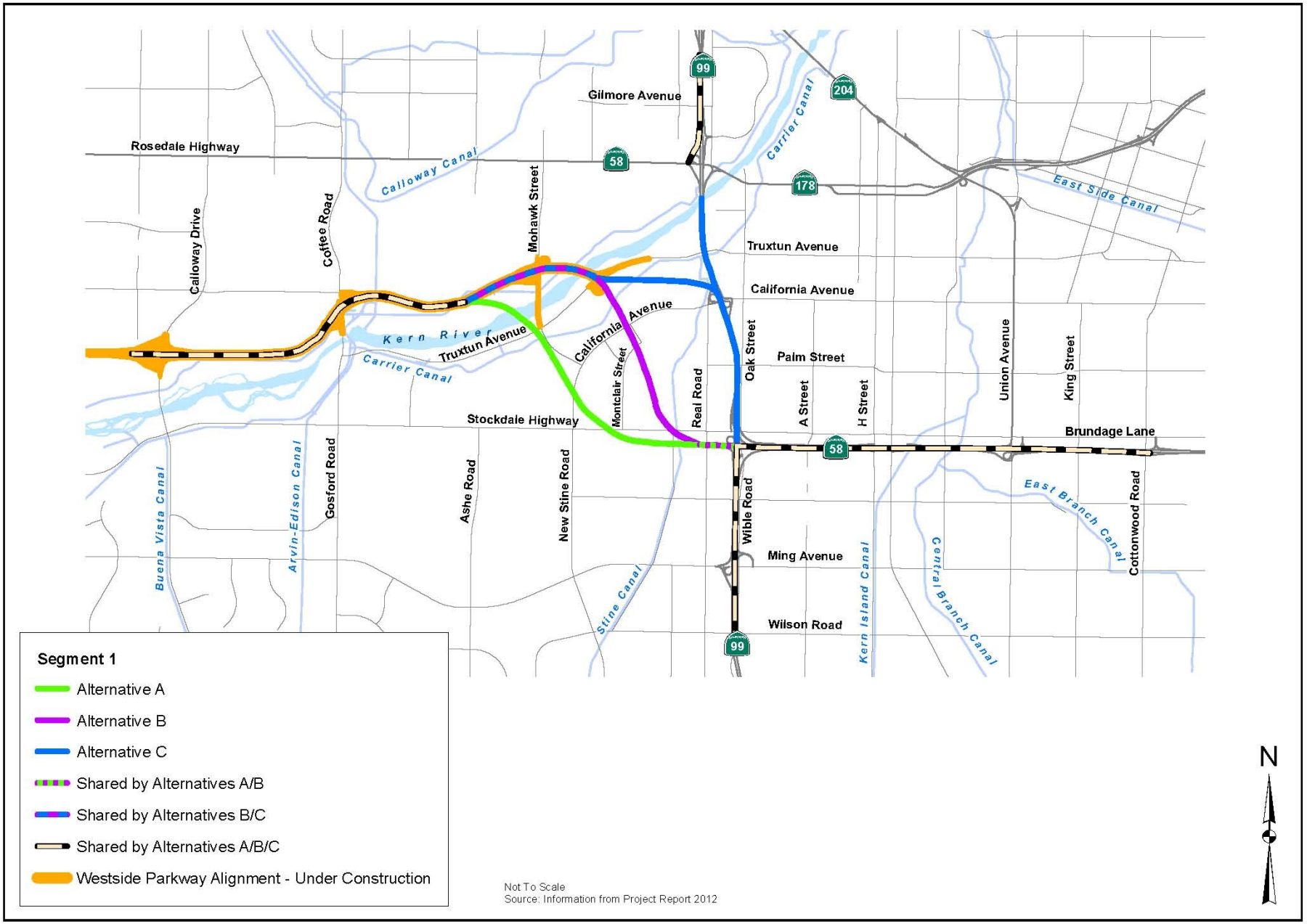

Figure 2.—Segment 1 of the Centennial Corridor

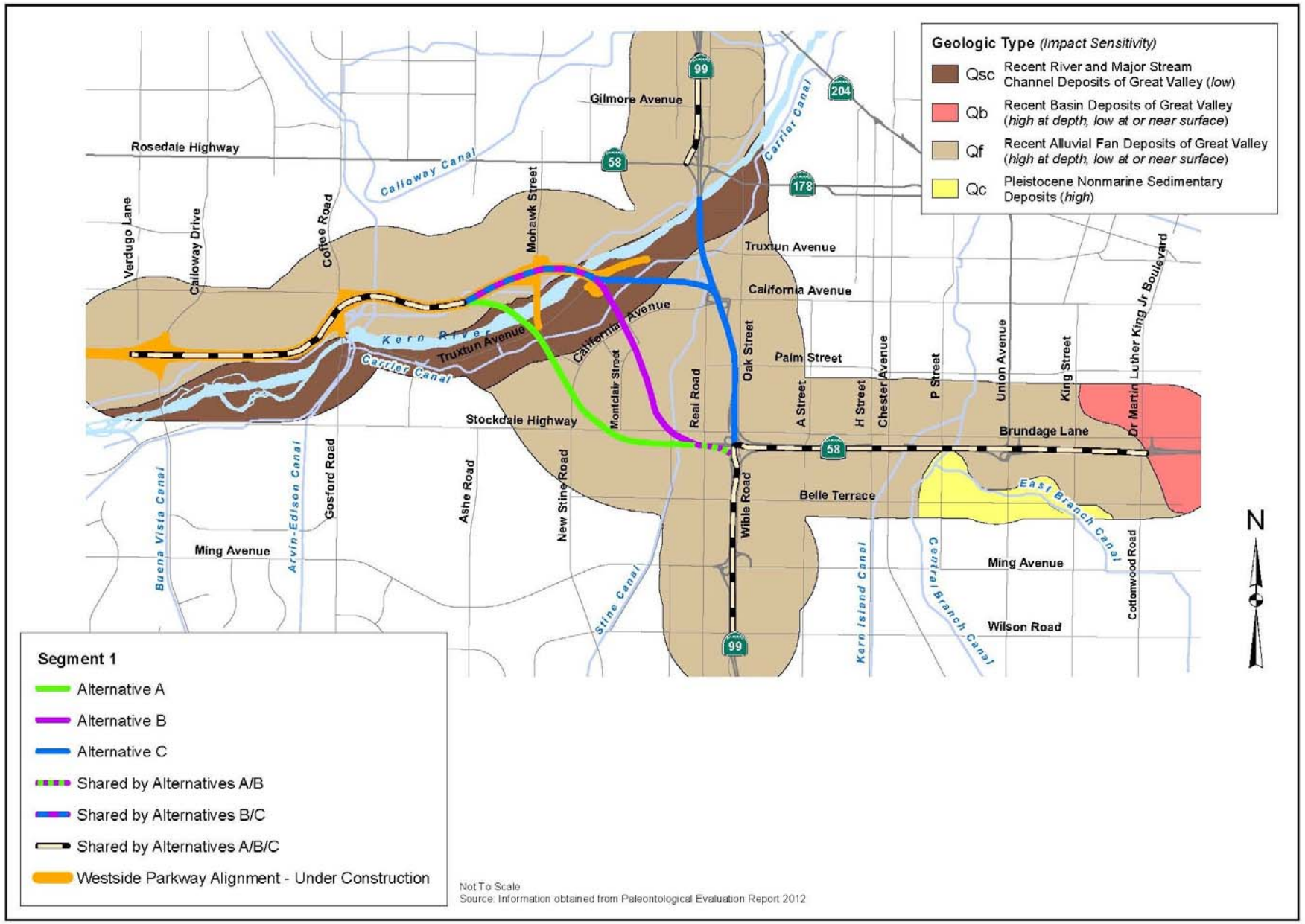

Figure 3.—Topographic map of the Centennial Corridor Project area, Kern County, California. Topographic base maps: USGS Taft and Tehachapi, California, 1:100,000-scale metric topographic (30 X 60 minute quadrangle) maps (1891 and 1978, photoinspected 1990, respectively).

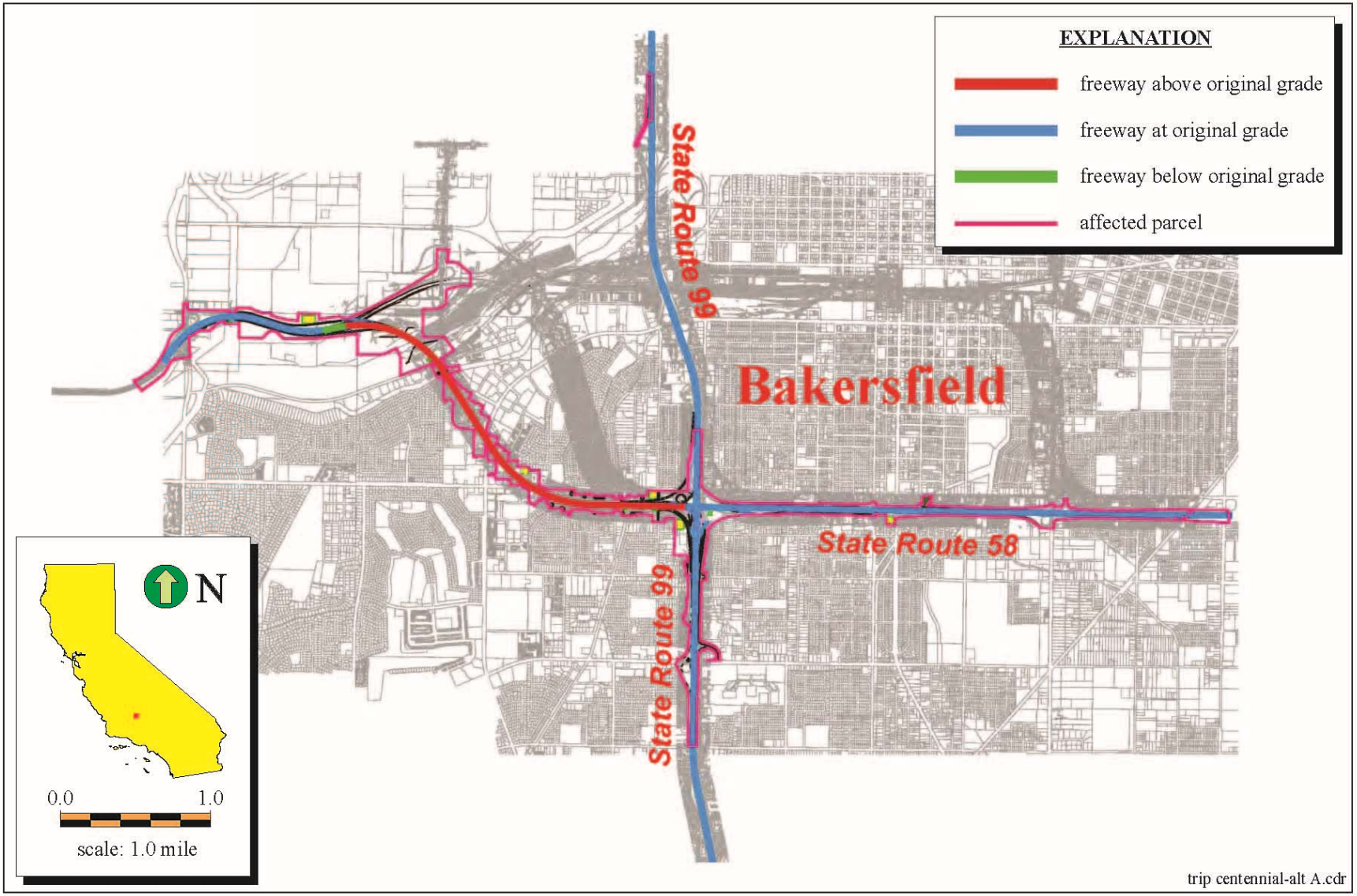

Figure 4.—Map of the Centennial Corridor Project Alternative A, Kern County, California.

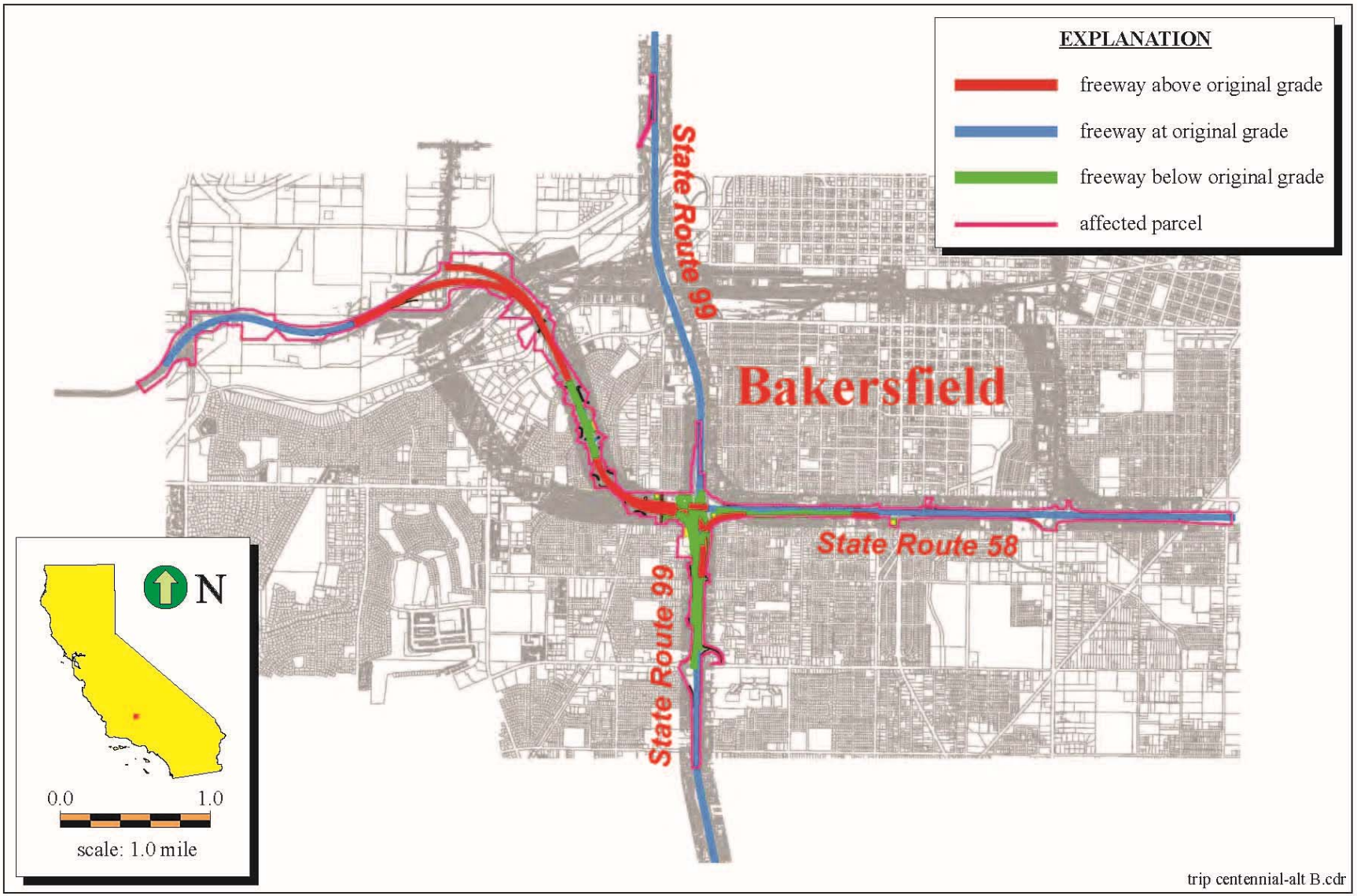

Figure 5.—Map of the Centennial Corridor Project Alternative B, Kern County, California.

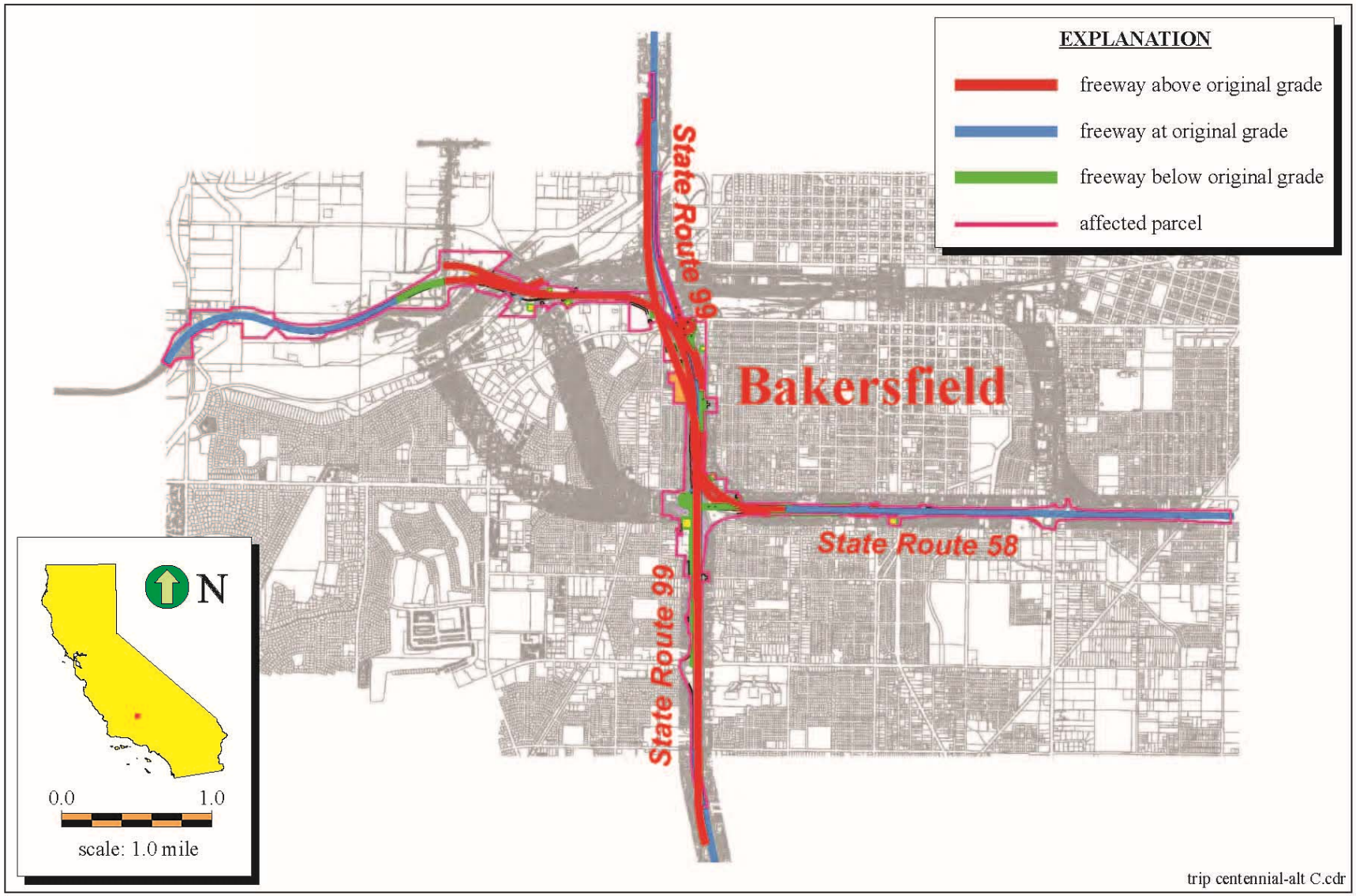

Figure 6.—Map of the Centennial Corridor Project Alternative C, Kern County, California.

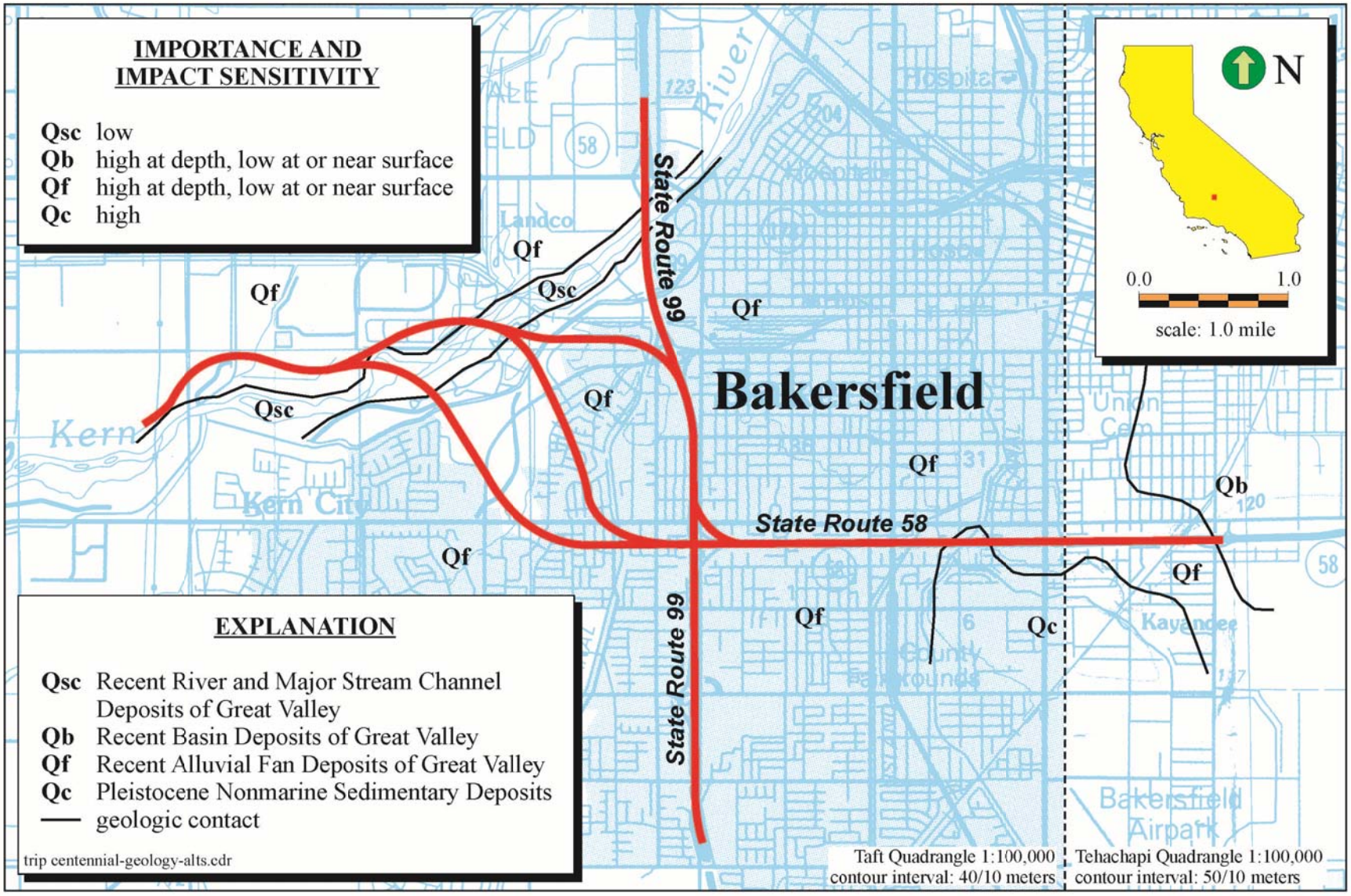

Figure 7.—Topogragphic/surficial geologic map showing paleontological importance or impact sensitivities of rock units underlying the Centennial Corridor Project area, Kern County, California. Topographic base maps: USGS Taft and Tehachapi, California, 1:100,000-scale metric topographic (30 X 60 minute quadrangle) maps (1981 and 1978, photoinspected 1990, respectively). Geology after Smith (1964).

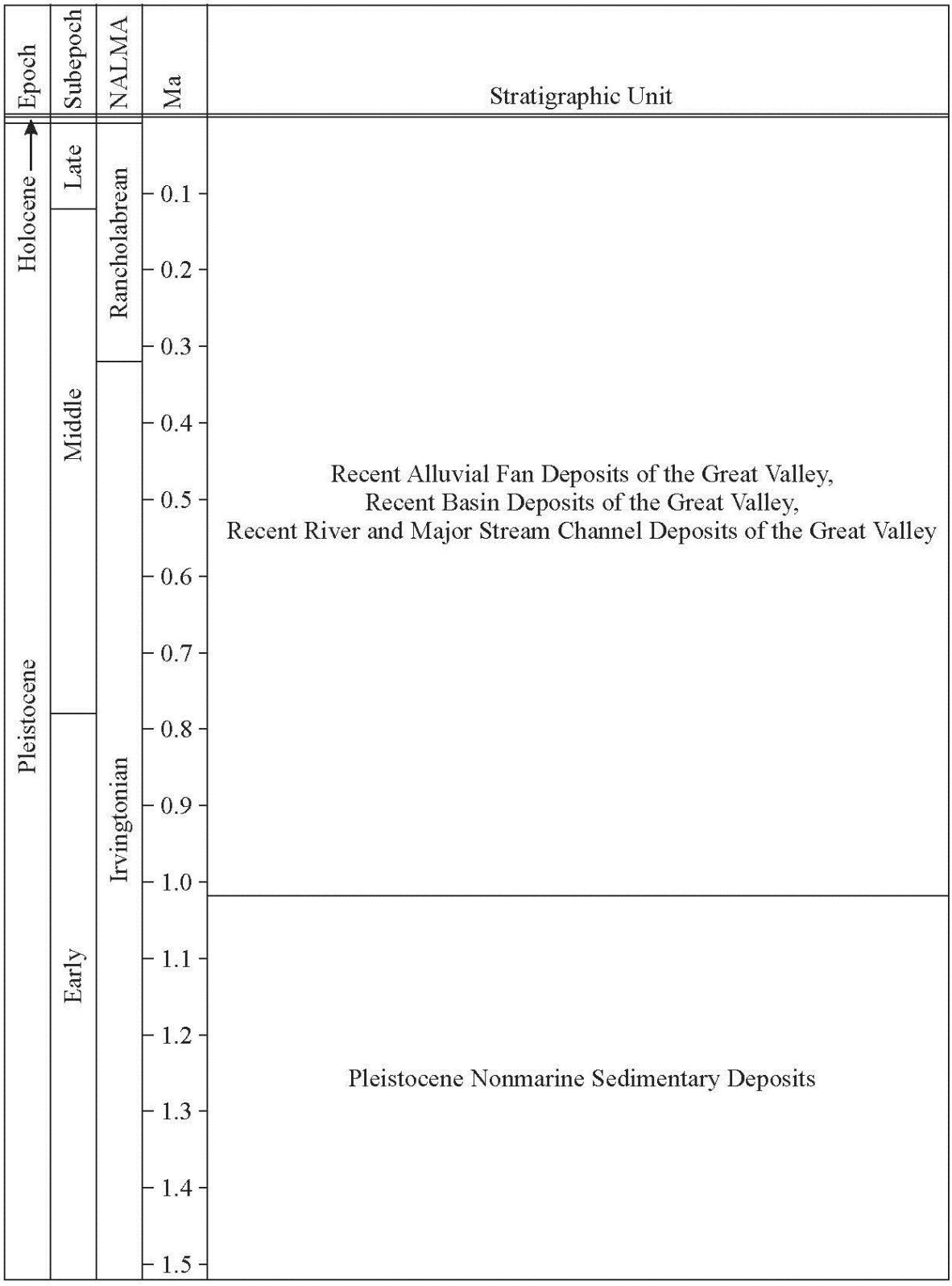

Figure 8.—Geologic time scale for rock units underlying the Centennial Corridor Project area, Kern County, California.

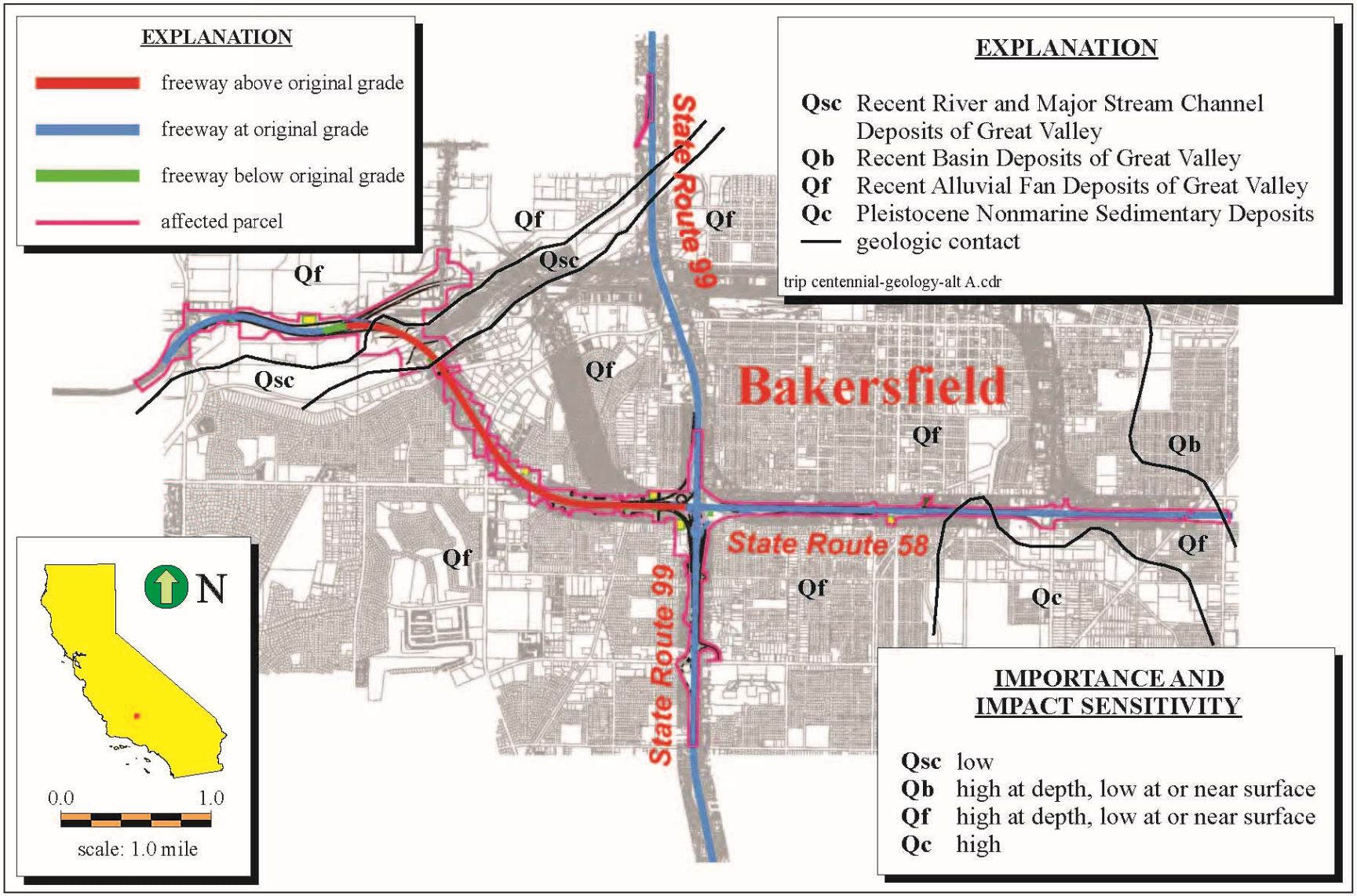

Figure 9.—Surficial geologic map showing paleontological importance or impact sensitivities of rock units underlying the Centennial Corridor Project Alternative A, Kern County, California. Geology after Smith (1964).

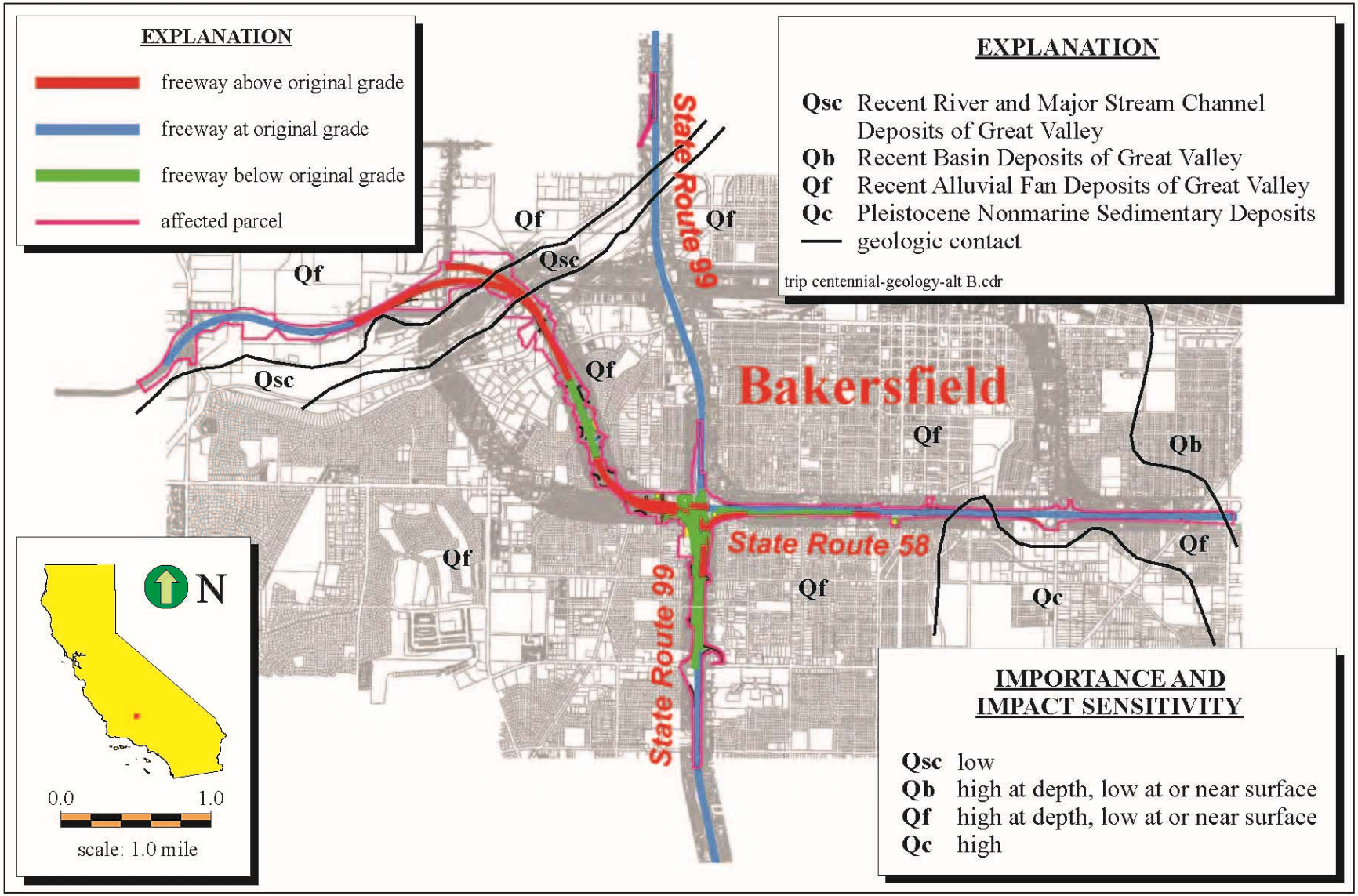

Figure 10.—Surficial geologic map showing paleontological importance or impact sensitivities of rock units underlying the Centennial Corridor Project Alternative B, Kern County, California. Geology after Smith (1964).

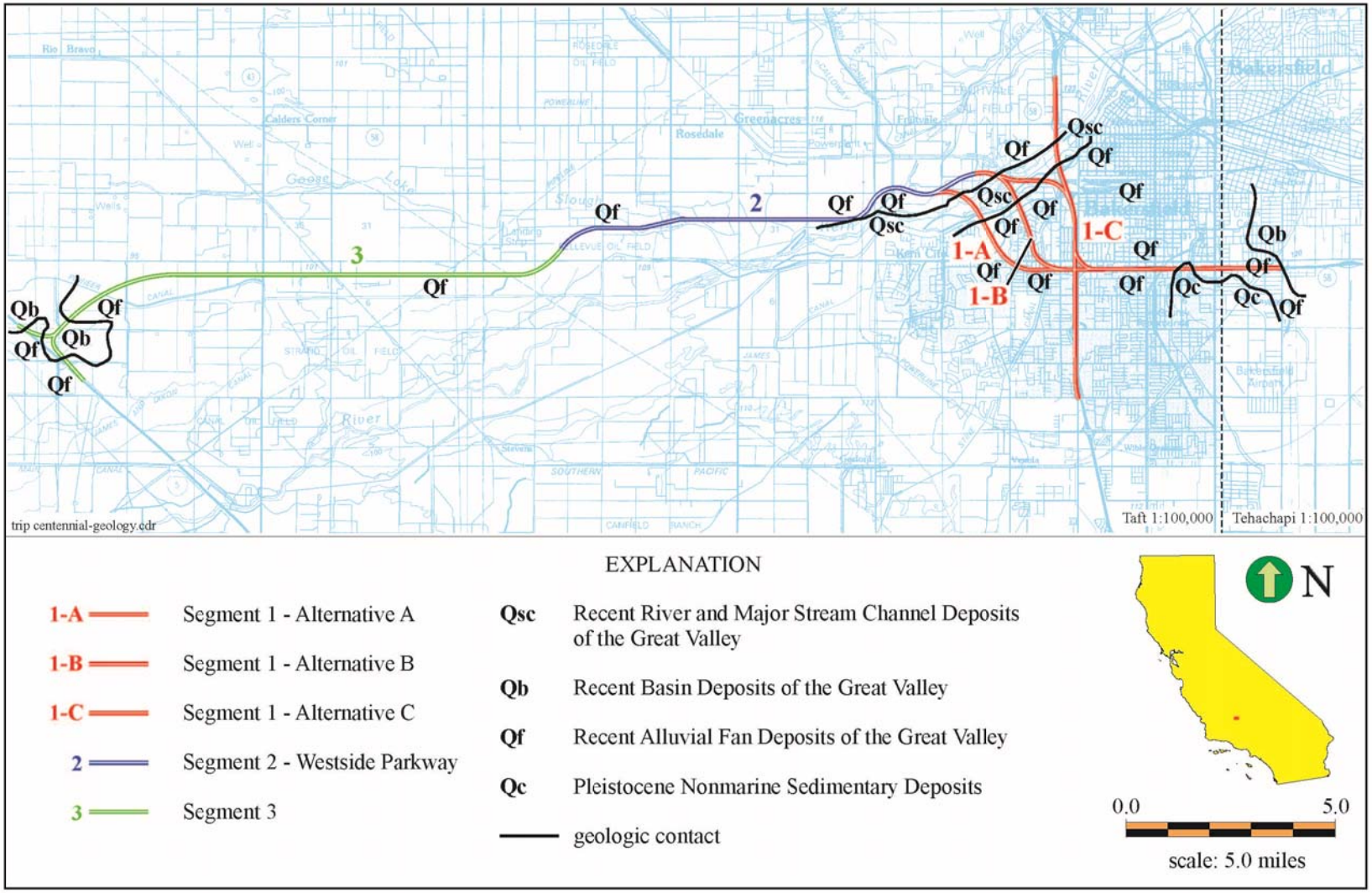

Figure 12.—Topographic/surfical geologic map of the Centennial Corridor Project area, Kern County, California. Topographic base maps: USGS Taft and Tehachapi, California, 1:100,000-scale metric topographic (30 X 60 minute quadrangle) maps (1981 and 1978, photoinspected 1990, respectively). Surficial geologic mapping after Smith (1964).

Appendix B Resume of Preparer

Resume of

E. BRUCE LANDER, Ph.D.

Principal Investigator, Senior Vertebrate Paleontologist

Paleo Environmental Associates, Inc.
2248 Winrock Avenue
Altadena, CA 91001-3205

Experience Summary

Extensive paleontologic resource management experience conducting and managing paleontologic resource/impact assessments and impact mitigation programs for large construction projects in California, Nevada, Utah, Wyoming, Arizona, New Mexico, Texas, and Maryland. Projects include municipal solid waste landfills; aggregate quarries; dams and reservoirs; aqueducts; flood control and groundwater recharge facilities; irrigation systems; cogeneration plants; solar energy and electrical generating plants; oil refineries; water pipelines/tunnels; oil and natural gas pipelines; electrical transmission lines; freeways, tunnels, and other roadways; subways; tramways; waste water treatment facilities; housing developments; planned communities; hotels; office buildings/complexes; business and industrial parks; shopping centers; hospitals and medical centers; convention centers; movie studios; parking lots/structures; marinas and marine supply facilities; space vehicle launch facilities; landslide stabilization and lagoon enhancement projects; geotechnical drilling programs; land exchanges; regional overviews; and conditional use permit, specific plan, and general plan revisions. Clients include private industry, public utilities, and federal, state, county, city, and regional agencies. Paleontologic resource assessments entailed data searches (literature reviews, archival searches, field surveys, consultation with other paleontologists) to develop baseline inventories, evaluation of scientific importance of resources and potential for disturbance by adverse project-related impacts, and formulation of mitigation measures to reduce these impacts to an acceptable level. Paleontologic resource impact mitigation programs required monitoring of earth-moving activities, recovery of fossil remains and fossiliferous rock samples, supervision of field personnel, and preparation of progress and final reports. Projects involved extensive coordination and consultation with project proponents, other consulting firms, and permitting agencies; adherence to strict delivery schedules; and completion within specified budget limits. Over 30 years of professional experience as a paleontologist and 20 years as a paleontologic consultant involved in paleontologic resource management and NEPA/CEQA compliance. Extensive paleontologic research background in land mammal faunas and vertebrate biostratigraphy of Tertiary continental formations of the southeastern, central, and western United States. Research entailed literature reviews, archival searches, field surveys, and consultation with other paleontologists.

Experience Record

1988-Date Paleo Environmental Associates, Inc., Altadena, California. Principal Investigator. Developed and manages paleontologic resource management consulting program; prepared paleontologic resource assessments and corresponding EIR/EIS sections for numerous major earth-moving projects in California, including China Shipping and Yang Ming Project, Puente Hills, Weldon Canyon, Marsh Canyon, Elsmere Canyon, and Altamont Landfill EIRs; Eastern Transportation Corridor EIR/EIS; Luz Solar Energy Generating System III to XII, Texaco Sunrise Cogeneration and Power Project, Kern River Transmission Line, Etiwanda Peaking Power Project, La Jolla Energy Project, Mountain View Power Plant Project, Malburg Generating Station Project, and Elk Hills Power Project AFCs; Anaverde/City Ranch EIR (Palmdale) Playa Vista EIR; Metropolitan Water District of Southern California (MWD) Eastside Reservoir and Inland Feeder EIRs; Santa Monica Mountains National Recreation Area Land Exchange EIS; and City Ranch, West End Area, Santa Fe Ranch Specific Plan and Keystone Development EIRs (Santa Clarita); managed Simi Valley Landfill expansion, Santiago Canyon Landfill, Foothill Ranch, Shell Oil Company Wilmington Manufacturing Complex SCOT unit, Eastern Transportation Corridor, Los Angeles Metro Rail Red Line, Sutter Power Plant, Malburg Generating Station, Meridian Oil Inc. 16-Inch Natural Gas Pipeline (Southern California Edison Cool Water Generating Station), Western Fox Field Property Development (Lancaster), Anaverde/City Ranch (Palmdale), Caltrans Red Rock (SR 14) Four-Lane Upgrade Project (09V129), and MWD Inland Feeder, Cajalco Dam and Detention Basin, and Headquarters Facility paleontologic resource impact mitigation programs. Conducted paleontologic mitigation monitoring compliance and reporting for Los Banos-Gates 500kV (Path 15) Transmission Line Project. Presented prepared testimony before California Energy Commission.

1985-1990 Engineering-Science, Inc., Pasadena, California. Project Manager, Paleontologist/Geologist. Developed and managed paleontologic resource management consulting program; prepared numerous paleontologic resource assessments for projects in California, Arizona, Utah, Wyoming, New Mexico, Texas, Nevada, and Maryland, including Simi Valley Landfill Expansion EIR, Pacific Texas Pipeline Project EIR/EIS, Mojave-Kern River-El Dorado Natural Gas Pipeline Projects EIR/EIS, Los Angeles Metro Rail MOS-2 EIR/EIS, and Orange County Foothill Transportation Corridor EIR; prepared paleontologic resource assessment overviews of southern Ventura County for Ventura County Resource Management Agency, City of Simi Valley sphere of influence for City of Simi Valley Department of Community Development, Southern California Edison BiCep Project; supervised Los Angeles Metro Rail MOS-1 and interim Simi Valley Landfill paleontologic resource impact mitigation programs;

assisted in preparing public relations program for Waste Management of California; prepared geology/seismicity sections of environmental documents for numerous construction projects.

1984-1985 Wirth Environmental Services/Dames and Moore, San Diego and Santa Barbara, California. Paleontologic Consultant. Prepared paleontologic resource assessments for Southern California Edison Mead/McCullough-Victorville/Adelanto Transmission Project ER and Argus Cogeneration Expansion Project and Midway-Sunset Cogeneration Project AFCs. Presented prepared testimony before California Energy Commission.

1984-1985 San Bernardino County Museum, Redlands, California. Paleontologist. Identified vertebrate fossil remains; prepared educational fossil exhibits; assisted in docent training, preparation of technical reports regarding results of paleontologic resource impact mitigation program for Los Angeles Department of Water and Power Intermountain Power Project transmission line corridor and Western Association of Vertebrate Paleontologists 1985 Field Trip Guidebook and Volume.

1982-1985 Marine and Environmental Science Associates, Inc. (MESA^2, Inc.), La Crescenta, California. Project Manager, Paleontologist/Geologist. Developed and managed paleontologic resource management consulting program; prepared paleontologic resource assessments for projects throughout California, including Sacramento Municipal Utility District's Geothermal Public Power Line Project (NOI and AFC) and ARCO's Coal Oil Point Project EIS/EIR; assisted in preparing geologic reports and maps on southern California continental borderland; assisted in preparing expert testimony for presentation before California Energy Commission.

1980-1981 Woodward-Clyde Consultants, San Francisco, California. Paleontologic Consultant. Supervised paleontologic resource impact mitigation program for MAPCO pipeline in Wyoming; assisted in preparation of paleontologic resource assessment. Projects included MAPCO's Rocky Mountain high-pressure liquid hydrocarbon pipeline project and Public Service Company of New Mexico's New Mexico Generating Station project.

1980 Research Reports Center (division of William Kauffman, Inc.), Los Altos, California. Copy Editor. Edited and abstracted technical reports for EPRI (Electric Power Research Institute) Guide and Journal.

1977-1979 U.S. Geological Survey Paleontology/Stratigraphy Branch, Menlo Park, California. Physical Science Technician. Conducted paleontologic resource impact mitigation program at Stanford Linear Accelerator Positron Electron Project ring.

1970-1976 University of California Museum of Paleontology, Berkeley, California. Research Assistant. Supervised vertebrate fossil collections and curatorial assistants during summer, 1976. Other positions included Teaching Assistant and Senior Museum Preparator.

1965-1970 University of California Department of Geology, Los Angeles. Laboratory Assistant. Prepared, identified, and curated fossils.

Education

B.S., Geology, 1969, University of California, Los Angeles

M.A., Paleontology, 1972, University of California, Berkeley

Ph.D., Paleontology, 1977, University of California, Berkeley

Professional Registrations

Certified Paleontologic Consultant, County of Orange, California

Registered Paleontologic Consultant, County of Riverside, California

Registered Paleontologic Consultant, County of Ventura, California

Professional Societies

Paleontological Society

Society for Sedimentary Geology

Society of Vertebrate Paleontology

Geological Society of America

Paleontological Research Institution

American Association for the Advancement of Science

Association of Environmental Professionals

Institutional Affiliations

Research Associate, Natural History Museum of Los Angeles County

Appendix C Segment 2 – Revalidation Memo

WESTSIDE PARKWAY PROJECT
PALEONTOLOGICAL EVALUATION TECHNICAL MEMORANDUM
DECEMBER 2011

Purpose of the Technical Memorandum

In January 2007, the Westside Parkway Final Environmental Assessment (EA) and Environmental Impact Report (EIR) was completed and approved by the Federal Highway Administration (FHWA), California Department of Transportation (Caltrans), and City of Bakersfield (City). The document evaluated environmental impacts for the proposed 8.1-mile-long east-west freeway that extends from Heath Road at Stockdale Highway to a point near State Route (SR) 99 at Truxtun Avenue in Bakersfield and an unincorporated portion of Kern County (see Attachment 1). Since approval of the EA/EIR a number of design refinements have been necessary and re-validation reports were prepared to assess the potential environmental impacts associated with the design refinements. As part of the Centennial Corridor Project (Project), the Westside Parkway would be incorporated into the State Highway System.

Project Description

The Westside Parkway is under construction. This technical memorandum is focused on the potential impacts associated with the designation of the roadway as State Route 58 and providing the connection to the existing State Route 58, State Route 99, and ultimately to
Interstate 5.

Paleontological Evaluation

Segment 2 of the Project is underlain by Recent Basin Deposits of the Great Valley (Figure 12). As discussed above in the PER for Segment 1 of the Project, this rock unit has a high potential for containing the fossilized remains of Pleistocene land mammals. As indicated above, a separate environmental document was prepared to address the construction impacts associated with Segment 2, which is already under construction. The incorporation of the Westside Parkway into the State Highway System would not result in impacts to paleontological resources.

Appendix D Segment 3 – Revalidation Memo

SEGMENT 3 – WESTERN CONNECTION TO INTERSTATE 5 PALEONTOLOGICAL EVALUATION TECHNICAL MEMORANDUM

JANUARY 2012

Background

The need for improvements that would provide continuity for State Route 58 was identified in the 2002 *Route Adoption Study for State Route 58* and the associated Environmental Impact Statement/Environmental Impact Report (EIS/EIR), which was prepared pursuant to the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) as part of a previous Route Adoption Study conducted by Caltrans, the Federal Highway Administration (FHWA), and the Kern Council of Governments (2002). The EIS/EIR addressed a 16.9 mile section of highway from Interstate 5 (I-5) to State Route 99 (SR 99) (post mile 35.4 to post mile 52.3.). The intent of the study was to adopt an alignment and allow the purchase of right-of-way. Though the environmental document was finalized, formal action was not taken on the route adoption. However, the preferred alignment identified in the 2002 Route Adoption Study was moved forward as the alignment evaluated in the *Westside Parkway Environmental Assessment/Final Environmental Impact Report* (Segment 2).

The preliminary alternatives evaluation conducted as part of the EIS/EIR considered a number of options, including:

- Expansion of capacity on the existing Route 58
- Adoption of a multimodal transportation corridor in one of two different alignments
- Mass transit
- Transportation Systems Management
- No Action Alternative

All the alternatives except the adoption of a transportation corridor on either the Kern River or Cross Valley Canal alignments and the No Action Alternative were withdrawn from further consideration because either they did not meet the purpose and need or the magnitude of the environmental impacts were determined to be unacceptable. The Kern River and Cross Valley Canal alignments proposed different connections to I-5 west of State Route 43 (Enos Lane). East of State Route 43 these two alternatives assumed the same alignment, which is consistent with Westside Parkway alignment.

Project Description

The Cross Valley Canal Alternative was selected as the Least Damaging Practicable Alternative (LDPA). This alignment alternative, which is reflected as Segment 3, assumes an east-west alignment parallel to the Cross Valley Canal from Heath Road to I-5.

Paleontological Evaluation

At such time as construction of Segment 3 is proposed, a project-specific environmental documentation process will be followed to evaluate in more detail the potential impacts of that project. However, Segment 3 of the Centennial Corridor Project is underlain by Recent Alluvial Fan Deposits of the Great Valley and Recent Basin Deposits of the Great Valley (Figure 12). As discussed above in the PER for Segment 1 of the Project, both rock units have a high potential for containing the fossilized remains of Pleistocene land mammals that might be encountered at depths greater than about 3 feet below the current ground surface by Project-related earth-moving activities associated with construction of Segment 3 (i.e., rock units would be highly sensitive to impacts accompanying these activities). The loss of such remains and associated specimen data and corresponding geologic and geographic locality data as a result of these activities would be an adverse environmental impact. However, at the time the project-specific environmental document is processed, a Paleontological Mitigation Plan would be prepared to reduce the impact of the earth-moving activities.

Until Segment 3 is constructed traffic would utilize Stockdale Highway between Heath Road and I-5 on an interim basis. The interim improvements would be limited to the area in the vicinity of Stockdale Highway and State Route 43. The proposed improvements would widen the intersection and add signals to control traffic movement. Enos Lane would be widened to add a dedicated left-hand turn lane in both directions. The depth of construction would be limited. However, should final design plans identify construction activities that would disturb the Recent Alluvial Fan Deposits of the Great Valley and Recent Basin Deposits of the Great Valley rock units, then the measures presented above for incorporation into the Paleontological Mitigation Plan for Segment 1 would be applicable to the interim improvements in Segment 3. Implementation of these measures would reduce the impact of the earth-moving activities.